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Chemical

The Chemical Trade Journal.

The Chemical Trade Journal.

THE

CHEMICAL TRADE JOURNAL.

A WEEKLY NEWSPAPER DEVOTED TO

The Commercial Aspect of the Chemical and allied Industries.

EDITED BY

GEORGE E. DAVIS.

Formerly one of Her Majesty's Inspectors of Alkali Works.
Chemical Engineer and Consulting Chemist.

VOLUME I.

[MAY TO DECEMBER, 1887.]

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THE

MICAL TRADE JOURNAL.

Editorial.

CAL JOURNAL! Yes, we fancy we
aking this observation; yet when
TRADE JOURNAL comes to be
ly, it will be found to differ very
chemical newspaper published in this
y of strictly commercial chemical litera-
d when we consider that no British
tely with Chemical Engineering, we
this venture may be successful.
ny chemical newspaper or journal now
our wish, and we hope there may be

er, that a chemical newspaper, to be
with useful commercial information,
greater intervals than weekly, and as
no being, it is to be hoped that those
nicals, as well as those who use them,
this Journal a medium of information

ade by means of our advertisement
ialities and novelties permanently before
charging such low rates for advertise-
een attempted in this country before.
ration these facts, we seem to be pub-
ich will supply a great want. THE
OURNAL will contain information use-
alkali makers, dyers, calico printers,
ers, oil refiners, aniline dye makers and
ers, gas engineers, paint and varnish
makers, colliery proprietors, brewers,
starch manufacturers, brick and tile
acturers, chemical engineers, metal-
ufacturers, the manufacturers of fine
chemists, and others.
ing, a science so neglected in England
ave its due share of attention, and it is
to attract the notice of all those manufac-
s to adopt the best methods of working,
be kept posted up with the latest
ry out chemical operations on the large
that we have not studied this subject
bours on the Continent, but there is no
ly should not now be commenced in

ses have been made a success from a
w, there is still the commercial side to
which combines these two in a popular
be read with interest than one filled
on pure chemistry or wholly taken up
s. There is the happy medium to arrive
ope to attain in time, but at the outset
y until we have ascertained the numbers
our clientelage before we can hope to
their individual tastes.

The Trade Reports from the various importa at indu
centres—London, Manchester, Tyneside, Liverpool, W
Glasgow, Birmingham, and Bristol—will, it is hoped,
a bond of union between the manufacturers in the v
districts, and it is intended to give items of trade gos
our column devoted to Notes and Queries.

Chemical and other investments, as well as a con
record of chemical patents, will be given their proper
of attention—the former carefully watched for us by a
and share broker of repute, while the chemical and
patents will be extracted from the records of the
Office in our own establishment.

France and Germany have, during the last twenty
made enormous strides in the application of chemistry
arts and manufactures. Why is it? The answer is, b
they have nearly fifty journals publishing and reviewi
latest improvements and discoveries, while in Engla
journal has yet to be found, capable of freely and
petently criticising subjects in chemical technology, ch
engineering, and commercial chemistry. We sincerel
that this want may be found supplied in THE CHE
TRADE JOURNAL.

CHEMICAL EXHIBITS AT THE MANCHES
EXHIBITION.

THE Royal Jubilee Exhibition at Manchester was
on Tuesday, May 3rd, with a great flourish of trum
their Royal Highnesses the Prince of Wales and the P
of Wales. The buildings are situated in the Bo
Gardens at Old Trafford, and the Executive are to b
congratulated on the appropriateness of their choice,
introduction of the new buildings amongst so much t
old, and so well known, not only to the residents
district, but to visitors also, has acted as a charm, d
people within it who otherwise would not, perhaps
given the matter a passing thought.

We often hear the stereotyped phrase that exhibitic
getting stale and unappreciated, but judging from the
dance at the Manchester Royal Jubilee Exhibition, we
imagine that their day was not over yet. The Man
Exhibition is unique in its kind; it is the first exhibit
have seen which could be said to have been pra
finished on the opening day. There are to be no me
prize awards, and last, and not least, goods are nc
sold in the Exhibition unless they are manufactured t
We have roamed throughout the vast buildings in o
discover the whereabouts of that individual who so
tently at other exhibitions sets before you his pate
burner which is to save 75 per cent of your gas-bill,
yet we have not found him. At other places he h
ample opportunities of pestering visitors, so much
many flee from the sight of such a stall as Asiatics
pestilence, whether at the Healtheries, or the Fisher
Inventories, or the Colinderies, for the abatement of
or the economy of fuel, there was the patent gas
be found; but in the Manchester Exhibition, where
May it be that he is in some dark recess hiding h
under a bushel, or is it true that the rule relating to t
of goods has actually crushed him out?

Doubtless the great feature in the Exhibition is the
tion of machinery in motion, and as most of this is

factured in the immediate neighbourhood of Manchester, the sight from the overhead galleries will show at a glance the great importance of Manchester as a manufacturing centre. There are several exhibits in this annexe we feel constrained to mention here as being in a great measure connected with the chemical and allied industries, but we must wait until we have gone through the list of Section III., treating of chemical and the allied industries proper, and which is the next feature of interest in the Exhibition. The Irish section certainly comes next, and there are many exhibits we shall notice as coming strictly within our province.

When we say that the section devoted to the chemical and allied industries is the second feature of interest in the Exhibition, we may be understood to refer to those immediately concerned in such manufactures. It is easy to see by a simple walk through the south-east gallery where this section is located, that it is not a popular one in the ordinary sense of the term, and it is a great question whether the Allotment Committee have not unduly crowded the india-rubber section with miscellaneous articles in order to keep the upper room clear for a good display for a select few.

It was at first feared that the chemical section would be weak, as certain trade jealousies had crept in, and some of our most important manufacturers would not send their cases in consequence. This might have been serious, but through the timely action of Mr. Watson Smith, the chemical lecturer at Owens College, who has taken so much personal interest in this Exhibition, many manufacturers were induced to come forward, so that in the end more space was applied for than could be granted. We are of opinion that the whole of the credit of the getting together of the chemical and allied exhibits in this section belongs to Mr. Watson Smith, as there was no one else upon the committee having such a good general knowledge of the trades represented and of personal contact with the firms themselves.

But when we come to criticise the work of the Allotment Committee, which we suppose includes that of classification also, we must say we are grievously disappointed; there is no law or order anywhere. The committee may have acted according to the best of their ability, but we feel bound to say that bad is the best in this case. Why chemical plant, pumps, a model of the manganese recovery process, etc., should be placed in one room, and drawings of the same in another room a quarter of a mile away, passes our comprehension, but only shows the absolute incapacity of the Allotment Committee to deal with their subject. If we more closely examine the other exhibits, we shall find plenty of examples of a similar nature. In the centre of the first room amongst the chemical exhibits proper, there is a sample of the water from the river Irwell precipitated with Messrs. Peter Spence and Sons' alumina ferric cake; there is only another exhibition of water purification by chemical processes to be found, and that has been placed at the end devoted to safety matches, and next door to the stand devoted to gymnastic appliances. To take another instance—opposite a stand devoted to sugar, and close to one exhibiting lager beer, is to be found a case containing products from the distillation of coal; the remainder of the exhibits relating to coal distillation are to be found in the centre of the upper room. The recovery of some of the products used for disintegrating wood in the manufacture of paper form part of an exhibit, while the recovery of the soda used in the making of paper from esparto is placed a quarter of a mile away. But it is when we turn to exhibit 797 in Group VII. that the height of absurdity is reached. Even in the catalogue, Group VII. is described as containing "Dyes and colouring matters from other sources than coal-tar," yet 797 is described as consisting of "Baking, custard, egg, and blancmange powders," etc. Let any one examine it carefully and say whether its proper place is where it is now.

No doubt that microscopes and appliances for the collection and preservation of pond-life are to some extent necessary to chemical and the allied industries, but we fail to see why an exhibit of this nature should take up wall space which should have been devoted to the exhibition of diagrams and *drawings which are not now in their proper places.*

There is no doubt that much of this incongruity would have been avoided had more time been given to the selection of the committee, and we have no doubt that had the whole matter been left entirely in Mr. Watson Smith's hands it would have been properly done; as it is there are many complaints, but in order to make it appear to outsiders that unanimity reigns supreme, it is not likely that much will be heard about it, except as a suppressed grumble.

There seems to be a general disposition to show, not merely what is made upon the works of the exhibitors, but also what they sell, and it must not by any means be taken for granted that the chemicals displayed in all the cases are manufactured by the firms exhibiting them. In fact, so far as regards the coal-tar colours, the reverse would be nearer the truth, as amongst the exhibitors in this exhibition the large majority of the colours of this nature are of foreign origin. And there is this disposition also, in the cases of many of the exhibitors, to place therein articles which have only a very slight reference to their manufactures, and which have never been made in the works from which the exhibit emanates. And if the sight of those cases from abroad containing fine chemicals does not stir up the inventive faculties of the English manufacturers, we may say we think they are quite beyond hope of reform. To-day we are in the midst of trying times so far as the manufacture of chemicals is concerned, and looking at the matter from an all-round point of view, we may imagine that the Darwinian law is slowly acting and leading to a survival of the fittest.

It is our intention in future numbers of THE CHEMICAL TRADE JOURNAL to devote special attention to all the exhibits in this exhibition, and we shall in every case follow the method of classification adopted by Mr. Watson Smith in the official catalogue, which is as follows:—

I.—Chemical and Chemical-Physical Appliances and Apparatus.
II.—Hygiene.
III.—Destructive Distillation.
IV.—Lakes, Pigments, Paints, and Varnishes.
V.—Bleached and Coloured Fibre.
VI.—Fine Chemicals, Alkaloids, Essences, and Extracts.
VII.—Dyes and Colouring Matters from other sources than Coal-Tar.
VIII.—Metallurgy.
IX.—Alkalies, Acids, and Salts.
X.—Fats, Oils, and Soaps.
XI.—Tanning.
XII.—India-rubber, Guttapercha, &c.
XIII.—Building Materials.
XIV.—Sugar, Gums, Starches, &c.
XV.—Miscellaneous.

In our next issue we shall commence a description of Chemical Appliances and Apparatus.

THE ALKALI TRADE.

THE low tendency of prices in all things manufactured manifests itself more strongly perhaps in the alkali trade than in any other. Previous to the year 1872 the output of chemicals had not been excessively large, and following closely upon the Franco-German war, when trade was stagnated upon the Continent, it was not surprising that a small increased demand should have played havoc with the buyers, as it did in this case. Alkali makers, as well as other branches of the chemical profession, were misled into thinking that the demand, which showed then no prospect of shrinking, would go on for ever, they increased their output to the full extent of their works, built and extended new works, and even in some cases pulled down the old in order to make way for the new. Those who adopted this last course have, as is well known, been driven out of existence, while there are many others at the present time who scarcely know whether they are standing on their heads or on their sandals. A comparison of the prices of 1872 compared with those of to-day may not be uninteresting:—

	April, 1887.	Feb., 1872.
Caustic Soda Ash (50°/₀)	£4 3 4	£10 10 0
Carbonated Soda Ash (50°/₀)	4 3 4	10 10 0
Refined Alkali (50°/₀)	4 8 6	10 15 0
Caustic Soda Cream (60°/₀)	6 11 3	15 10 0
" " White (60°/₀)	7 0 0	16 0 0
" " " (70°/₀)	8 0 0	19 0 0
Bleaching Powder	7 12 6	12 10 0
Soda Crystals	2 10 0	5 5 0
Bicarbonate of Soda	6 5 0	14 0 0
Salt Cake	1 4 0	4 0 0
Chlorate of Potash	6½d. per lb.	1s 6d. per lb.
Sulphate of Copper	14 10 0	29 0 0
Sulphate of Ammonia	11 0 0	22 0 0
Lump Alum	5 0 0	7 0 0
Refined Borax	30 0 0	95 0 0
Brimstone (best thirds)	——	6 12 6

The foregoing list of prices will show at once how serious has been the fall in values, and it may truly be said that even at these low prices some of the articles are practically unsaleable; even the bleaching powder convention, with its restricted output, is unable to raise the price of this article above £7, 12s. 6d. for softwood, and it is also noteworthy how many manufacturers of repute are scouring the country endeavouring to find an outlet for their salt-cake.

In a paper read by the writer before the Society of Arts in May 1877, the price of salt-cake was advisedly stated for forward at 55s. per ton, but the Alkali makers present, one and all, strongly insisted that this was absurd, and that 84s. was nearer the mark. There is no doubt they believed with Shakespere, "Thy wish was father, Harry, to that thought," but it is a little significant that from that day forth the price of salt-cake began to decline, and it has never lifted its head since. Salt-cake in 1872 was over £4 per ton f.o.r. at the works, and to-day it could be bought for less than 24s. Now what is the cause of all this? It is simply that the old Leblanc makers had extended their plant to such a degree as was not warranted by the demand, seeing that other countries were not totally idle, but were having an eye to business also. The fact is that the year 1872 saw a new cycle of the world's increased industry; nearly every country of the world was prosperous and prices were high; profits were large, and unfortunately manufacturers began to think that Mistress Trade would never look behind her again. The falsity of the position has now been proved, and the coal production of the world stands a record to the fact that England is not alone in the race, and that other countries are expecting and demanding their share of the spoils. The returns of the coal production of the world for the years 1870 and 1885 will show the increasing activity of other countries:—

	1870. Tons.	1885. Tons.
England	120,000,000	159,351,000
United States	35,468,000	96,931,000
Germany	26,397,000	60,000,000
France	13,330,000	21,000,000
Belgium	13,697,000	17,346,000
Russia	760,000	3,950,000
Austria	4,295,000	7,191,000

For the eleven months, however, ending November 30th, 1886, our coal exports have been less than they were for the same period in 1885, and the declared value sixpence per ton lower.

At some future date we shall have occasion to notice the senseless way in which our coal is being dragged from the earth, with reference also to the economy of fuel, but the question now before us is the depression of prices in the alkali trade. It will be remembered that after the extension of many Leblanc soda works, the ammonia-soda process appeared on the scene, and not only have these works grown up in our midst, but have also been erected abroad, and supply those customers to whom it had formerly been our privilege to send.

The enormous works of Messrs. Brunner, Mond, and Co., at Winnington, near Northwich, are works which the old Leblanc alkali makers must reckon with. The appearance of 1,400 tons of carbonate of soda in an already overstocked market is no fair sight for the struggling alkali makers to see every week, and when we come to consider the foreign ammonia-soda works, it is quite certain that the outlook of the ordinary alkali maker is very gloomy indeed. As yet, those manufacturers who work the ammonia process have not succeeded in their attempts to send bleaching powder into the market; neither have they been any more successful in their endeavours to produce caustic soda by any other method than the old lime process, in which they are certainly at a great disadvantage compared with the Leblanc process. Should such a process be discovered, it is easy to see that the calling of the followers of Leblanc is gone for ever, if they do not now bestir themselves and set their house in order against the new combinations which threaten them.

If Dr. Pick's new ammonia-soda process is erected at Northwich, the Leblanc makers may just as well make up their mind to leave soda-ash alone, and to turn their attention more fully to the manufacture of bleaching powder, and last, though not least, to find another outlet for commercial salt-cake, to put it to other uses, or to find out a process by means of which soda-ash may be manufactured at a cheaper rate than by the ammonia-soda process. It is quite certain that salt-cake is now the *bête noir* of the Leblanc alkali makers, and any new process to use it up should be welcomed on all sides, but it is very doubtful whether any proposal to manufacture anything else than alkali would receive serious consideration from them.

Then again, even the bleaching powder market seems so very fickle that a little extra would soon break down prices; it is only just moderately firm under the rigid discipline of a convention and a very limited output. If manufacturers commence to economise, it must be in either one of two directions—either they must produce more from the same materials, or else they must turn out the same quantity from less; in the former case, the market will be damaged, while in the latter the plant will not be fully occupied and standing charges proportionately increased.

Turning our attention to bicarbonate of soda, we see also the immense fall in value which this article has experienced. Up to within quite a recent date the market was very well supplied with this commodity, but Messrs. Brunner, Mond, and Co. are now introducing large quantities, and the price must eventually suffer. Large quantities are also being made from crystal carbonate by the firm of Gaskell, Deacon, and Co., and it is said that they have already secured about half the trade of the United Kingdom. Chlorate of potash is in no better odour; look at the tremendous extensions and additions which have been made to these plants since 1876; these alone prohibit any hope of an advance in price, and the recent action of the Widnes Alkali Company in entering into an already overstocked market in order to keep their caustic plant going, is sure to keep down the price of chlorate of potash for some time to come.

One thing which has wonderfully helped the ammonia-soda process has been the very great fall in the value of sulphate of ammonia. This commodity is no exception to the general remark that all chemicals have suffered reduction, it having fallen in price from £22 to £11 per ton since 1872. An increase in the number of ammonia-soda works and an advanced price for sulphate of ammonia may before long force many Leblanc makers into another groove, and to cause many of them to stir up those faculties of invention and enterprise which they have allowed to remain dormant so long.

SULPHATE OF AMMONIA:

ITS PRODUCTION AND USES.

SULPHATE of Ammonia is an article the demand for which for its present uses is comparatively of modern growth. Its first preparation in quantity was from the dry distillation of coal in the manufacture of coal-gas; the foul

gas-water produced in the early days of gas making was generally allowed to flow into the nearest ditch or water-course, but when the quantities increased to such an extent that the air was polluted with sulphuretted hydrogen, the watercourses rendered foul and unhealthy, and the neighbouring wells so contaminated that complaints arose on every side, there arose a generation of manufacturing chemists of sufficient ability to cope with this increasing evil.

The first patent which appears to have been taken out for the manufacture of sulphate of ammonia on the commercial scale, was by William Menish, in 1792, where he mixes "gypsum, selenite, or any other substance composed of calcareous earth united to vitriolic acid, with sufficient volatile alkali to saturate the vitriolic acid." He states that after some hours of mixing, the calcareous earth falls to the bottom, and "vitriolic ammonia" may be drawn off.

There is but little doubt that at this time the volatile alkali spoken of in the foregoing specification was obtained as a by-product from the distillation of bones, and in June 1815 we find that John Taylor obtained protection for a process for making sulphate of ammonia by passing the inflammable air given off during the distillation of bones through sulphuric acid.

So matters remained until 1839. Up to this time the manufacture of sulphate of ammonia could not have been large; the greater portion of the ammonia recovered from bones, and also much of that produced from the steadily increasing quantities of gas-liquor, was made into carbonate and muriate of ammonia, and also into sal-ammoniac, the manufacture of which in those days yielded a handsome profit.

Probably the first manufacturer of repute dealing extensively with sulphate of ammonia was Mr. Alexander Angus Croll, who is even now connected with the Glasgow Alum and Ammonia Company. But the demand for sulphate of ammonia did not come with the first manufacture of sulphate of ammonia; the manufacture came first, and the demand had to be manufactured also. Mr. Croll laboured hard to introduce the new salt to the notice of farmers in his native country, and after 50 years of hard work, the results only go to show the conservative nature of the inhabitants of the British Isles, the extent of our prejudices, and the relatively large quantity of the material shipped abroad for the use of agriculturists there.

Up to the year 1874 nearly the whole of the sulphate of ammonia manufactured went for agricultural purposes. Some was applied to the land direct as a top dressing, and the remainder was used to "fortify" superphosphate, and to form those special manures of which some agricultural chemists are so proud. It is only, however, within the last few years that the advantages of the use of sulphate of ammonia as a manure have been fairly put before agriculturists, and this has been done very effectively by the Sulphate of Ammonia Manufacturers' Association, whose executive distributed during 1886 many thousand copies of a handbill throughout the agricultural districts, setting forth the advantages of its use to farmers, agriculturists, land owners, and others, and in this spring of 1887 over ten thousand handbooks relating to the various uses in agriculture for sulphate of ammonia have been distributed by the members of the association. Thus far, everything which could have been done has been effected to bring sulphate of ammonia under the notice of farmers and others, but still we are only able to say that 10 per cent is used in this country for agricultural purposes, 10 per cent more is used for manufacturing purposes, while the remaining 80 per cent goes to enrich the land of the foreigner.

Of the 10 per cent which is used in this country for manufacturing purposes, some is employed in the manufacture of carbonate and liquid ammonia, but the bulk has been directed into an entirely new channel, viz., for use in the ammonia-soda process. And its use for this purpose seems [illegible]tend.

[illegible]resent time sulphate of ammonia is principally [illegible]he ammoniacal liquor of the gasworks, a certain [illegible]oduced in boneworks, and from shale oil and ironworks, where these products are recovered from the waste gases. The quantity of sulphate of ammonia made during 1885 was as follows:—

	Tons.	
Scotland and Ireland...	18,274.	In oil and iron [illegible]
,, ,, ...	8,855.	In gas-liquor [illegible]
North of England	3,000.	
Cheshire, North Wales, and part of Lancashire	1,532.	In gasworks.
	690.	In boneworks.
	1,206.	In sulphate works.
Widnes District	520.	
East Lancashire and Yorkshire	16,000.	
South Midland	——	
South West of England	3,420.	
London and South East	33,000.	
Total	99,697.	

The production is not, however, perfectly regular the whole of the year through. From the oil and iron works, as well as from the boneworks, the supply is fairly constant and continuous, but from the gasworks the two winter quarters yield very much more than the summer quarters. Roughly speaking, 100,000 tons of sulphate of ammonia are produced annually in the United Kingdom, and the quantities made in the various quarters of the year will be as follows:—

January, February, March	32,300 tons.
April, May, June	17,500 ,,
July, August, September	15,900 ,,
October, November, December.....	34,300 ,,

The quantities sent out from the five principal ports of the United Kingdom during the year 1885 may be seen in the following table:—

	January February March	April May June	July August September	October November December
London	12,241	7,643	5,096	5,321
Hull	6,826	4,925	3,176	3,190
Leith	3,117	2,042	4,742	3,681
Liverpool	3,146	1,064	1,661	1,857
Glasgow	533	661	1,299	1,357
Totals ...	25,863	16,335	15,974	15,406

Grand Total..... 73,578 tons.

It will thus be seen that during the summer months the demand exceeds the supply, but that in the winter months the production is too great for foreign consumption, so that all manufacturers of sulphate should use their utmost endeavours to increase its use at home.

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

By treating manganese ores with muriatic acid, Scheele, in 1774, first obtained chlorine, which was then known as dephlogisticated muriatic acid, in accordance with the existing doctrine of Phlogiston. Berthollet, in 1785, maintained that this substance ought rather to be regarded as oxygenated muriatic acid, and this view was generally retained until the year 1809.

The bleaching properties of this oxygenated muriatic acid were discovered very soon after the discovery of the element itself, and in the form of gas, or as a solution in water it was very early used in the arts for bleaching purposes.

In the years 1809-1810, Gay-Lussac and Thénard showed by numerous experiments that it was very probable chlorine was an elementary substance, and the support given to this view by Sir Humphrey Davy led no doubt to the early adoption of the theory, which we all regard now as correct.

In the early days of artificial bleaching, the user of chlorine had of necessity to prepare his own, and this was universally done by heating a mixture of 1 part of common salt, 1 part of well-ground manganese ore, and 2¼ parts of oil of vitriol.

its weight of water in a leaden still furnished

seen that the use of chlorine entailed con- to the bleacher, and efforts were made by g chemists of that time to produce an article iser of chlorine as the gas he was already ear 1798 Mr. Charles Tennant obtained a ing "oxygenated muriatic gas" in "calcined s," which seems from the specification to e into a milk of lime and "put into the l in use by the bleacher for preparing his , and where hitherto a solution of alkaline in general use to catch and retain the atic gas." The lime milk was kept agitated, ne absorbing the chlorine, and by dissolving eaching liquor of excellent quality.

Charles Tennant discovered that dry or uld absorb the oxygenated muriatic gas, and a portable bleaching agent, one capable of to all parts of the world. Here, then, was ent of what has turned out to be a vast ne which has had its influence on the world.

already stated, the method of making the eating a mixture of common salt, manganese, l in a leaden still; the chlorine gas was e residue in the still consisted of the sulphates ganese, together with uncertain quantities of alt. In most instances this residuum was he nearest drain, though several chemical inly endeavoured to turn it to some profit- n one works with which we are intimately ed to be the custom to furnace the residue stills until most of the manganese sulphate , and then the crude salt-cake so made was king in the old Leblanc soda process. This atisfactory process, and though it answered e high, yet it had to be given up when me keener.

gham, in 1836, essayed to make sulphate minated with manganese, and to produce from the hydrochloric acid *per se*, but it is ar he succeeded in his attempts; it is certain, e drew attention to the importance of the w that the increasing demand for soda had s into existence, it was so far recognised as at the manufacture of sulphate of soda and f chlorine must be considered and treated as cesses.

ossage had at this time rendered the trade by thoroughly accomplishing the con- muriatic acid evolved in the manufacture of t tower employed by William Gossage being d windmill, filled with gorse and brushwood, water was copiously showered. But it was furnace" which was universally employed in of salt-cake in those days, and the fire gases the muriatic acid, and the vitriol employed did not conduce to the production of a very to the excellence of the condensation. In paid well enough in those days, and the ld afford to throw his muriatic acid away.

at the older manufacturers did not employ cid as the agent to attack the manganese ore ure of chlorine, was no doubt owing to its w strength, but no sooner had the condensa- ic acid gas been improved that 22° to 28° Tw. tained without trouble, the universal practice oxide of manganese and liquid muriatic acid one-built stills, heated with open steam, and ulting chloride of manganese as a waste pro- whatever, and fit only for running into the watercourse.

tage, whose inventive genius for things ever been equalled by any other chemical ime or in any country, turned his attention to the recovery of the manganese from waste still-liquors early in the year 1837, and on August 13th of that year he obtained protection for a process for the preparation of artificial oxide of manganese from the precipitated protoxide, by causing it while in the state of hydrate to be agitated with atmospheric air so as to absorb the oxygen from it, and he also claimed the "use of the oxide so prepared for the purpose of producing chlorine by means of muriatic acid obtained from the decomposition of common salt."

(To be continued.)

Notes and Queries.

CLEVELAND IRON.—The April return of the Cleveland Ironmasters' Association shows the following as the month's makes of pig iron:—108,000 tons of Cleveland iron and 99,000 tons of other kinds, a total of 207,000 tons, or 4,000 tons less than in March. There are ninety-two furnaces blowing, fifty of which are making Cleveland pig iron. Stocks decreased 16,000 tons in April.

SIZE FOR PAPER MAKERS.—Dissolve in a copper pan heated by a steam jacket, 45lb. soda-ash in 20 gallons of boiling water; then add to it, stirring all the time, 3 cwt. of powdered resin, keeping the whole boiling until the resin is entirely dissolved, then dilute with water to 900 gallons. In another vessel soak 3 cwt. of glue in 40 gallons of water for twenty-four hours, then dissolve with steam. Mix the two solutions together, and boil for about ten minutes.

THE NORWEGIAN GOVERNMENT AND ENGINEERS.—The Norwegian Government have granted various sums of money, ranging from £25 to £100, to several engineers in order that they shall study various industries abroad. Thus, one proceeds to England and Scotland to study the newest construction of steamboat engines; another to Germany, to report upon the glue industry of that country and the best modes for utilising fish offal; one to Italy, to improve the import of Norwegian wood; one to England, Germany, and Sweden, to study the mining industries of those countries; one to Germany and Sweden, to study the manufacture of paper wood pulp; one to Germany and Sweden, to study the various telephonic inventions; and one to the same countries to study their dyeing industries.

SOCIETY OF CHEMICAL INDUSTRY.

MANCHESTER SECTION.

THE annual meeting of the members of the Manchester Section was held at the Victoria Hotel, on April 12th, for the election of the committee for the ensuing year. Much dissatisfaction was expressed at the way in which the nominations for the new committee had been made by the existing committee, and when the result of the ballot was made known it was found that Mr. Ivan Levinstein, the vice-chairman, had not been re-elected. Considerable feeling existed as to the way in which the committee have transacted their business during the past year.

Several days after this event, the new committee held a meeting to elect its officers, when Professor Hummel, of Leeds, resigned to make way for Mr. Levinstein, and this committee thereupon elected Sir Henry Roscoe, M.P., its chairman.

This action of Professor Hummel has caused great irritation, and only illustrates more forcibly the point which the members have taken in hand to reform. The majority at the meeting were of opinion that Manchester residents should take precedence on the committee of members living in Bradford, Leeds, Northwich, etc., but they felt sure that this would never be accomplished while the constitution of the committee remained as it was, and they are naturally much incensed at the action of the committee in nullifying their wishes at the annual meeting, so much so that an agitation has been already commenced with the object of infusing new blood into the committee at the next annual meeting.

CHEMICAL REPORTS.

LONDON.—The chemical works upon the Thames have been fairly busy, but competition from other quarters seems likely to keep down prices. To make oil of vitriol is just now change for a shilling, but a considerable profit is being made by the manufacturers of special chemicals. The coal-tar products market has relapsed into a state of quietude, benzol having fallen a little, but it is said that this is only owing to the action of certain firms who have much crude naphtha to purchase in order to cover their sales of benzol.

MANCHESTER.—Printers and dyers' chemicals are in great request, and a good business is being done in them. The aniline and other coal-tar dyes are selling well, but no one is anxious to put prices up, as all realise the fact that such a proceeding may mean the loss of customers. The bisulphide of carbon and chloride of sulphur makers are busy, though all are grumbling at the action of the railway companies in refusing to carry these substances.

TYNESIDE.—Nothing is spoken of here except the prevalence of low prices and the absence of long contracts. Soda-ash and soda-crystals have fallen, but bleaching powder maintains itself fairly well. The salt industry continues to make progress in South Durham, and it is said that several new boreholes are to be put down near West Hartlepool.

LIVERPOOL.—There is a slight improvement in the oil market; palm oil has been in good demand, while linseed and cottonseed have improved. As regards petroleum, sellers are offering refined American at 5¼d., while Russian is quoted at about ½d. less. Nitrate of soda is weaker, and the fall in values seems to have affected the sulphate of ammonia market also. Bleaching powder maintains its price fairly well, but caustic soda is difficult to sell at the quoted prices.

WIDNES.—Salt-cake is verily proving a drug on the market, and several firms are seriously considering how bleach may be made without making so much of it, or indeed of using their vitriol in some other way. A further fall in price has occurred, and good salt-cake may be bought for 23s. 6d. f.o.r. at the maker's works. Soda-ash and caustic soda are very difficult of sale, but bleaching powder is in good request. A large maker here has started using his vitriol for producing superphosphates, but since starting this article has dropped in price from 45s. to 36s. for 26 per cent.

BIRMINGHAM.—The dulness which characterises nearly every other chemical market is not quite so apparent here, mainly on account of the variety of chemicals manufactured. For fluoric acid there is a good demand, as the glass trade is brisk with plenty of orders coming in. Nitric acid is in good demand, but the price is low, and the same may be said of "dipping" acid. The local manure trade has not been very good this spring, though one firm of manufacturers has been very busy.

BRISTOL.—The alkali trade here is not so dull as it is in other centres, but the trade in ammonia salts cannot be said to be in the most flourishing condition. Muriate of ammonia is difficult of sale, and sal-ammoniac is so small an article that nothing can be done with it. In South Wales business seems improving in certain directions, and the inquiries for chemicals are more frequent; still, there is much room for improvement.

THE TAR PRODUCTS MARKET.

Anthracene has risen slightly, though no one seems to know why this should have come about. Benzol is easier, and the demand for crude naphtha not quite so good. Grease oils are quite a drug in the market, and about 6s. per barrel of 42 gallons is all that is obtainable. Tar distillers must, however, be hopeful, as it is rumoured that the Derbyshire Chemical Company have been paying 15s. for the Sheffield Gas Company's tar, and part of the Manchester tar has been sold to the firm of Hardman and Co. for 13s. 6d.

THE SULPHATE OF AMMONIA MARKET.

During the past week the market has been a little disorganised owing to the action of "bear" speculators. More sulphate has been exported this spring than has ever left these shores before; yet a cry has been continuously kept up that there is no foreign demand. A week ago so large a figure as £12. 5s. was touched at Hull, but owing to the action of a dealer who put a small quantity up for tender, £11. 10s. only was bid, and so well was this piece of news circulated that values tumbled down 5s. the first day. However much the "bear" element may have succeeded in preventing a rise in price for the present moment, it is not likely they will succeed for all time. Stocks were never more scarce either with producer or consumer; even a small demand over and above the ordinary outflow will produce a flutter in the market.

THE PATENT LIST.

6756. THOMAS TURNER. An improved method for filtering spent and other oils. May 9.

6768. CHARLES BRAMALL. An improved portable combined smelting and converting furnace, and apparatuses employed therein. May 9.

6774. JAMES LYLE. Improvements in and connected with the burning of oils and other hydrocarbon fluids as fuel in furnaces. May 9.

6776. ERNST KORTING. Improvements in injectors. May 9.

6793. SAMUEL KLEIN and ALEXANDER SCHATTELS. Improved composition for caulking casks and such like. May 9.

6802. JOHN HOYLE. Improvements in burning cement and lime, and in kilns for the same. May 9.

6818. HUGH WILLIAMS. Improvements in the method of generating inflammable gaseous vapour, applicable for heating, lighting, and actuating power, and apparatus therefor. May 10.

6875. ANNIE MATILDA WOOD. Improvements in the treatment of india-rubber, caoutchouc, guttapercha, and analogous gums. May 10.

6882. JAMES EZEKIEL EMERSON and THOMAS MIDGLEY. Wire belting and method of manufacturing the same. May 10.

6897. GEORGE HIBBERT. Improvements in apparatus for straining pulp used in the manufacture of paper. May 11.

6909. CARL FRIEDRICH CLAUS. Improvements in processes for obtaining sulphur from iron pyrites, copper pyrites, zinc blende, and other metallic sulphides. May 11.

6914. JAMES SINGLETON HOOPER. An improved method for treating hides and skins for leather and other purposes. May 11.

6936. PRIMUS JUSTUS EMIL HEFFTER. Improvements in the method of clarifying and saturating sugar solutions, especially beet-root rob, by the means of tannic acid or tannin. May 12.

6941. RICHARD WALTER PUGH. Improvements in lamps for burning hydrocarbon vapours in combination with coal-gas. May 12.

6949. THOMAS WALLACE GRANT. Improvements in bottles or vessels for delivering liquids in drops and other quantities, and in the means employed therefor. May 12.

6985. AIMÉ POTTIER. Improved Apparatus for separating solid impurities from the water of steam boilers. May 12.

6986. WILHELM SANZENBACHER and SEBASTIAN TANATAR. Method and apparatus for distilling fatty acids by means of superheated steam. May 12.

6991. HERRMANN TRAUTMANN. Improvements relating to the plating or crating of wood, leather, and other articles or materials with metal by electro-deposition. May 12.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

'ues stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

		£	s.	d.
:tic, 25 °/₀	per cwt.	0	10	6
;enic...	,,	0	15	0
romic	per lb.	0	0	8
ioric	,,			
riatic (Tower salts) 30° Tw.,	per bottle	0	0	6
,, (cylinder) 30° Tw. ...	,,	0	2	0
ric, 80° Tw.	per lb.	0	0	2¾
rous...	,,	0	0	2¼
alic	,,	0	0	4
phuric (fuming °/₀)	,,			
,, (Brimstone 168°) ...	per ton	4	5	0
,, (Pyrites 168°)	,,	3	10	0
,, (spent oxide 168°) ...	,,	4	0	0
,, (,, 150°)	,,	2	5	0
,, (Pyrites 150°)	,,	2	0	0
'taric	per lb.	0	1	7
... ...	per ton	5	0	0
·880 = 28°	per lb.	0	0	3½
= 24°	,,	0	0	1¾
Carbonate	,,	0	0	3½
Muriate	per cwt.	1	2	0
,, (sal-ammoniac) ...	,,	36/- & 34/-		
Sulphate (grey), London ...	per ton	11	17	6
,, (grey), Hull	,,	11	15	0
l	per lb.	0	0	10½
lt	,,	0	0	9
.. ..	per ton	33	0	0
(tartar emetic)	per lb.	0	1	3
loride	per ton	7	10	0
rbonate (native)	,,	4	5	0
lphate (native levigated) ...	,,	3	10	0
Powder, 35 °/₀	,,	7	12	6
Liquor, 7 °/₀	,,	2	15	0
of Carbon	,,	13	0	0
DYES:—				
: (artificial) 20%	per lb.	0	0	9
... ...	,,	0	5	6
PRODUCTS:—				
me, 30 °/₀ f.o.b. Goole,	per unit per cwt.	0	0	8½
90 °/₀ ,, ...	per gallon	0	3	6
50 °/₀ ,, ...	,,	0	2	10
Acid (crystalised 35°) ...	per lb.	0	1	0
(crude 60°)	per gallon	0	2	8
(ordinary)...	,,	0	0	0½
(filtered for Lucigen light)	,,	0	0	1
'aphtha, 30 °/₀ @ 120° C.	,,	0	1	1
)ils, 22° Tw.	per ton	1	7	0
).b. Liverpool or Garston ...	,,	0	11	6
Oils (crude)	per gallon	0	0	0½
(distilled)	,,	0	0	1
ıili bars)	per ton	39	5	0
lphate	,,	14	2	6
ide (copper scales)	,,			
.. ..	per cwt.	1	17	6
crude)	per ton	33	0	0
refined)	,,	52	10	0
ıgs)...	,,	1	13	0
ide (blue billy)	,,	0	6	6
(bog ochre)	,,	1	13	0
(precipitated	,,	3	0	0
ate (copperas)	,,	1	5	0
ide (antimony slag)	,,	1	2	0
:) for cash	,,	13	10	0
.te (white)	,,	24	10	0
te	per cwt.	22	0	0
(ribbon and wire)	*per oz.*	0	2	6
Chloride	*per ton*	2	5	0
Carbonate	*per cwt.*	1	17	6

		£	s.	d.
Magnesium, Hydrate	per cwt.			
,, Sulphate (Epsom Salts) ...	per ton	2	10	0
Manganese Sulphate	,,	19	0	0
,, Borate	per cwt.	2	5	0
,, Ore, 70 °/₀	per ton	2	10	0
Methylated Spirit, 60° O.P.	per gallon	0	2	4
OILS:—Castor	per cwt.	1	5	0
Cocoa-nut	per ton	26	0	0
Cotton-seed	,,	17	10	0
Colza	per ton	24	15	0
Linseed	,,	20	10	0
Lubricating, Scotch, 885°—890° ...	,,	5	10	0
Oleine	,,	18	0	0
Palm	,,	21	10	0
Petroleum (refined for burning) Russian	per gal	0	0	5
,, ,, American	,,	0	0	5¼
Rape	per ton	23	0	0
Rosin	,,	10	10	0
Sperm	per cwt.	2	15	0
Whale	,,	1	0	0
Silver (metal)	per oz.	0	3	7¾
,, Nitrate	,,			
STARCHES:—				
Sago	per cwt.			
Potato (farina)	,,			
Rice	,,			
Sodium (metal)	per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀	per ton	5	0	0
,, ,, (Caustic Soda-ash) 48 °/₀	,,	4	3	4
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	3	4
,, ,, (Soda Crystals)	,,	2	7	6
,, ,, (Crystal Carbonate) ...	,,	5	1	6
,, Chlorate	per lb.	0	0	7½
,, Borate (Borax)	per cwt.	1	7	6
,, Bichromate...	per lb.	0	0	2½
,, Hydrate (76 °/₀ Caustic Soda)...	per ton	9	12	6
,, ,, (70 °/₀ Caustic Soda)...	,,	8	0	0
,, ,, (60 °/₀ Caustic Soda, white)	,,	7	0	0
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	10	0
,, Bicarbonate	,,	6	5	0
,, Hyposulphite	,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	11	5
,, Silicate (glass)	per ton	5	10	0
,, ,, (liquid, 140° Tw.)... ...	,,	5	7	6
,, Sulphate (Salt-cake)...	,,	1	4	0
,, ,, (Glauber's Salts) ...	,,	2	2	6
,, Sulphite	,,	5	17	6
Potassium (metal)	per oz.	0	4	0
,, Bichromate	per lb.	0	0	3½
,, Carbonate, 90%	per cwt.	0	19	0
,, Chlorate	per lb.	0	0	6½
,, Hydrate (Caustic Potash) ...	per ton	23	10	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 °/₀	per ton	11	15	0
,, Muriate, 80 °/₀	per ton	9	5	0
Strontium Hydrate, 40 °/₀	per cwt.	10	0	0
Sugar, Beet	per cwt.	0	12	0
,, Cane	,,	0	15	0
Sulphur (Flowers)	per ton	9	0	0
,, (Roll Brimstone)	,,	5	15	0
Superphosphate of Lime (28 °/₀)	,,	1	16	0
Tallow	,,	22	0	0
Tin (metal)	,,	102	15	0
,, Crystals	per lb.	0	0	
Zinc (Spelter)	per ton	14	5	
,, Chloride (solution 96° Tw.)	,,	5	15	

CHEMICAL AND ALLIED INVESTMENTS.

Prepared expressly for the CHEMICAL TRADE JOURNAL *by* *Stock and Share Broker, Manchester.*

Stock or Shares.	Shares. £	Paid £	Last Dividend %	Name.		Price in 1886. Highest	Price in 1886. Lowest	Closing Quotation.
				Atlas Chemical Co.	Limited			
				British Gas Light Co.	,,			
				Brooke, Simpson, and Spiller	,,			
25,000	10	8½	25	Broxburn Oil Co.	,,			
				Brunner, Mond, and Co.	,,			
				Bryant and May	,,			
13,700	10	8½	20	Burntisland Oil Co.	,,			
				Burt, Boulton, and Haywood	,,			
				Charles Tennant and Partners	,,			
				Clayton Aniline Co.	,,			
18,390	10	10	7½	Clippens Oil Co.	,,			
2,700	10	7	25	Dalmeny Oil Co.	,,			
				Droitwich Salt Co.	,,			
				E. C. Powder	,,			
				Farmers' Manure Co.	,,			
				Greenbank Alkali Works	,,			
				Globe Alkali Works	,,			
5,000	10	6	8	Holmes' Oil Co.	,,			
				Jarrow Chemical Co.	,,			
				James Mc. Bryde and Co.	,,			
				Lancashire Alkali and Sulphur Co.	,,			
				Langsdale's Chemical Manure Co.	,,			
				Lawe's Chemical Manure Co.	,,			
20,000	10	8	10	Linlithgow Oil Co.	,,			
				Mason and Barry	,,			
				Muspratt Brothers and Huntley	,,			
				Netham Chemical Co.	,,			
				Newcastle Chemical Works Co.	,,			
				Odam's Chemical Manure Co.	,,			
				Phospho-Guano Co.	,,			
13,000	10	8½	10	Pumpherstone Oil Co.	,,			
				Rio Tinto	,,			
				Runcorn Soap and Alkali Co.	,,			
				Sadler and Co.	,,			
				St. Bede Chemical Co.	,,			
				Sullivan and Co.	,,			
				Tharsis Sulphur and Copper Co.	,,			
				Thomas Hadfield	,,			
				Tyne Alkali Co.	,,			
				Val de Travers	,,			
10,000	10	10	...	Walkinshaw Oil Co.	,,			
10,000	10	10	...	West Lothian Oil Co.	,,			
				West Norfolk Farmers' Manure Co.	,,			
				Widnes Alkali Co.	,,			
	10	8½	8	Young's Paraffin Light Co.	,,			

SATURDAY, JUNE 11, 1887.

ECONOMY OF MOTIVE POWER.

THE HARGREAVES THERMO-MOTOR.

THE continually increasing employment of mechanical power to supersede human labour continues to stimulate the search for economical forces requiring less of human supervision than the steam engine. The principal inducement to the use of gas engines is not so much that gas is cheaper, but that no expensive boiler is required, no fireman needed, no coals to get in, and last and not least, it needs no preparation for starting or stopping, and demands only to be kept in repair. The gas engine is automatic; it runs at a steady velocity, and regulates its own supply of fuel, so that it is not surprising that the bread-and-cheese engine should be steadily displaced by this or other forms of inanimate motors in all departments of industry where the labour question is only one of supplying so many foot-pounds of energy, setting aside skill or trustworthiness.

Apart from its physical side, this question entails social and political consequences which deserve consideration. In the absence of skill and trustworthiness, the workman, consuming human muscle, is reduced to a weak competitor with cheaper and more controllable inanimate motors, the operations of which can be calculated upon, and (to use the words of an employer) "neither steals, tells lies, nor gets drunk."

In Watt's time the steam engine consumed twelve pounds of coal per hour to produce one horse-power; that is now reduced to two pounds, or even to one and a half pounds. Researches in thermo-dynamics show that no matter what may be the working fluid, when the temperatures at the beginning and the end of the operation are the same the dynamical results are equally the same.

Watt's engine has been rendered more economical by engrafting upon it the inventions of Wolfe and Trevethick, whereby a more extensive application of Carnot's function has been possible.

$\frac{T-t}{T}$ is the maximum possible efficiency of any heat engine.

In Watt's time the temperatures of boiler and condenser were about 225° F. and 125° F. respectively, hence—

$$\frac{T-t}{T} = \frac{225-125}{225+461} = 0{\cdot}147$$

In the modern triple expansion engine, working at 150lb. per square inch, the numbers are:—

$$\frac{T-t}{T} = \frac{365-125}{365+461} = 0{\cdot}28$$

The engine does not receive all the heat given out by the fuel, but only so much as the boiler allows it in the form of steam, and in high-pressure boilers this is seldom more than 0·6. The efficiency of engine and boiler together are therefore only:—

$$0{\cdot}28 \times 0{\cdot}6 = 0{\cdot}168$$

The potential energy of good coal may be reckoned at 11,000,000 foot-pounds per pound of fuel consumed, therefore $0{\cdot}168 \times 11{,}000{,}000 = 1{,}848{,}000$ foot-pounds, or rather less than one horse-power. The best working results have given one horse-power for one and a half pounds of coal. The steam engine has evidently nearly attained to its maximum efficiency, unless pressures are to be still further increased, as a means of increasing the difference between T and t.

Gas engines give very much higher initial temperatures than steam engines, but high temperature brings its own difficulties. The materials of which the engine is made will only stand a limited temperature, *so the cylinder has to be kept cool by means of a current of water, which carries off half the heat given out by the fuel without doing* any mechanical work, and the exhaust gases are also ejected at high temperatures.

It is scarcely possible to *calculate* the efficiency of the gas engine under these circumstances, but Professor Thurston has shown by experiment that an Otto engine gave a working efficiency of 0·17, or equal to the highest possible efficiency of the steam engine.

The cost of heat produced by the combustion of coal-gas is much greater than that from coal, and prevents gas competing with steam except for small powers.

In hot-air engines, heated externally, high temperatures are employed, but the furnace portion acts even less efficiently than in the steam boiler, the products of combustion pass off with the greater portion of the heat of combustion unutilised, and the resultant economy is not enough to compensate for inconvenience due to overheating. Internally heated hot-air engines give much greater efficiency than externally heated ones, but have fallen out of use in consequence of the inevitable overheating of valves, and the abrasion caused by ashes or dust carried over into the working cylinder.

Mr. James Hargreaves, of Widnes, so well known as an indefatigable worker in thermo-dynamics, has been for some years experimenting on this subject with the object of rendering the T in Carnot's function as high as possible, keeping at the same time the t at its minimum, with results sufficiently startling to justify the hesitation shown by many engineers in accepting reports in circulation respecting his new thermo-motor.

Having had the opportunity of witnessing the experiments, we are able to supply the following data:—The engine is single-acting, and somewhat like the Ericson caloric engine; the working cylinder is 25in. in diameter, with a stroke of 18in. The diameter of the air pump is 15in., and has a similar length of stroke to that of the piston-rod in the working cylinder, to which the air-pump piston is actually connected. The temperature of the working cylinder is about 2,000° F., judging from the colour of the hot lining, and that of the exhaust is not more than 220° F., which includes steam and all the products of combustion. The maximum possible efficiency must therefore be:—

$$\frac{T-t}{T} = \frac{2{,}000-220}{2{,}000+461} = 0{\cdot}72$$

The speed of the engine was ninety revolutions per minute; the pressure in the reservoir, 45lb. per square inch; the consumption of coal-tar, two gallons per hour; while the indicated horse-power reached the figure of 29·7.

Although the maximum possible efficiency is 0·72, the numbers yielded by the foregoing experiments amount only to 0·174 of actual efficiency, so that although this is about equal to that of the gas engine, as shown by Professor Thurston's experiments, yet it is less than one-fourth of the actual efficiency due to difference of temperatures, so that there is still a large margin of allowance for improvement by thoroughly working out the system. As it stands at present, three gallons of gas-tar will do the same work as one thousand cubic feet of coal-gas in the gas engine, but whereas this quantity of gas costs in many places at least three shillings, the present value of three gallons of coal-tar is not more than threepence.

Mr, Hargreaves asserts that in the new engine now being constructed by Messrs. Adair and Co., the engineers of Liverpool, the actual efficiency will be made to approach much more closely to the theoretical, as there are many errors in the experimental engine which his long course of experiments will enable him to rectify, but which cannot be put right in the present one: the passages are much too contracted and the heating surfaces too small, while it was evident that the heat lost by radiation might be considerably reduced.

The success of this new motor has a greater connection with the amelioration of the atmosphere than most persons would imagine, as it is certain we cannot go on much longer devastating the country with coal-smoke in the way we are doing at present.

mills, drug mills, and other appliances, and a large assortment of hand-power mixers for light powders, liquids, and semi-liquids, all of which will be found of great service to the manufacturer of finer chemicals, or for use in the technical laboratory. The large scale laboratory experiment is an operation but very little known in England, but if manufacturers would cause every new process to be examined in this way before erecting plant to carry it out on the large scale outside, it would often lead to the saving of large sums of money.

The Harden Star and Sinclair Fire Appliance Company have made a good show of fire-extinguishing apparatus, which, however, does not so much interest us under the head of chemical exhibits as the new industrial light, the "Lucigen." It is well known that the work of building the Manchester Exhibition was carried on at night by its aid, and the fact that it has been so rapidly taken up by large firms in and around Manchester and Sheffield shows that the apparatus is no mere toy, but a serviceable and economical mode of lighting. We need not say more on this subject now as we have an article in preparation dealing with it in a more complete manner.

Exhibit 711 contains specimens of Mr. Otto Wolters' assay, chemical, and bullion balances. These must be seen to be appreciated; no amount of description will be satisfactory to the analyst on such a subject as this, or upon that of the short-beam balances also exhibited.

Mr. Joseph Lovibond, of Salisbury, has a stand (No. 704) devoted to a new laboratory appliance he styles a "Tintometer," and it seems to us a very useful piece of apparatus. It is essentially an appliance for measuring colour, and may be found of infinite value in analytical work. To all those who are in the habit of "Nesslerizing," estimating small quantities of iron by the "yellow prussiate" test, estimating the amount of carbon in steel, and many other such like processes, the Tintometer seems invaluable, as the exact tint can always be reproduced at a moment's notice by means of standard coloured glasses.

(To be continued.)

WASTE PRODUCTS AND THEIR RECOVERY.

When we look back upon the whole host of waste products which at one time were let loose from chemical and other manufactories in a fluid state, we are tempted to express surprise that many of them at least were ever designated as waste articles, and it may also appear strange to some of the younger members of the profession that there should ever have been any difficulty in finding a sale for many of the articles now produced from the refuse of some manufactories. And not only does this refer to fluid refuse but to solids also, though not to the same extent, as solid refuse has to be got rid of by an expensive mode of transit not known in the case of liquids, which are usually run into the nearest watercourse or into the public sewer.

If all kinds of refuse were solid bodies, or incapable of finding solution in water, it may be taken for granted some use would be found for them, as a tip for such substances is naturally expensive and the cartage account heavy; but where the refuse will flow away of its own accord, there is a very great temptation to let it go where it will. A glance over the waste substances of the past, and from which considerable profits are being made now, may not be uninteresting.

Perhaps the two oldest waste substances extant may be found in gas-tar and ammoniacal water, which began to be produced in large quantities during the first introduction of coal-gas. The first of these—gas-tar—was looked upon as a foully-smelling, useless [illegible]terial, and was often burned under the retorts i[illegible] get rid of it. It was nearly always given away [illegible]would take it, and much was wanted for gas-tar[illegible] [illegible]rough ironwork. A step in advance of [illegible] Dr. Longstaffe and Dr. Dalman, of Ed[illegible] the first tar distillery at Leith in [illegible]illed, and the crude naphtha was sent to Mr. Mackintosh for use in water-proofing his cloth. The residue in the still was consumed for the production of lamp-black. These few notes record the early history of the attempt to deal with one of the most foully-smelling waste products, and we can all bear witness to-day to the success which not only attended the first efforts, but to the more recent developments which have resulted in the establishment of an industry having no rival, and which is second to none in the entire field of chemical ingenuity. The waste substance known in the arts as ammoniacal water, or gas-water, has also a very interesting history, and is to a certain extent noticed in another page. The waste lime from the purification of coal-gas, by its excessively noxious character, caused the purification process to be changed to one in which oxide of iron was used in its stead; the sulphur could not be recovered from lime profitably, but the foul oxide of iron is to-day largely used for the production of a very pure oil of vitriol.

But the foregoing are specimens of products which have been rescued from the domain of waste substances, and have left a profit to the workers. How many products are now being turned into the nearest watercourse or into the public sewer which might, with a small amount of ingenuity, be made to produce some useful article, or to give work to some of the unemployed?

As an answer to this question, we have now in our mind's eye the case of a large paper mill which for the past fifteen years has been sending into the river over twelve tons of caustic soda weekly, when it is certain that by a very small expenditure that soda, or most of it, could be recovered, and leave a very handsome profit to the mill owner. In those mills where the soda is recovered there is no effluent soda to affect the streams, and the cost of recovery does not exceed 50s. per ton of 48 per cent ash, including wear and tear, fuel, wages, and all capital charges. When ordinary soda-ash costs at least £4. 10s. per ton at the mill, the suicidal policy of continuing to run the esparto liquor to waste is readily seen.

The case of soap-lees is another illustration. These lees contain all the glycerine present in the fats employed, yet in many soapworks in this country the whole solution is accounted a waste article, and no attempt is made to turn it to account. For many years previous to our attempts in this country, France and Germany were successfully working processes for the recovery of glycerine, while our own manufacturers were endeavouring to find out whether the thing could be done or not.

Take again the case of our bleachworks. All the soda used for "boucking" the cloth before the application of the bleaching solution is at present run away into the nearest stream. We are not aware that any attempt has ever been made to recover the soda from this source, or to render it useful for any purpose whatever.

In the manufacture of sulphate of ammonia from gas-liquor, the solution remaining in the still after the expulsion of the ammonia is invariably run away as waste; nevertheless it contains sulpho-cyanide of calcium in quantities often sufficient to make the extraction pay handsomely. There are plenty of markets for the various sulpho-cyanides, and there are many eager to get hold of fresh sources of supply, yet our waste of such a precious article continues. The old firm of Spence Bros. Limited, of Manchester, was one of the first manufacturers of crude sulpho-cyanides, both of ammonium and calcium, from waste products of gasworks; yet many manufacturers in the same district still continue to pour their still liquor into the nearest sewer. Surely there is room for some enterprise here.

In France and Germany we are bound to confess that all chemical operations are carried on more carefully than they are in England, and this is the case in America also; more attention is there paid to detail, whereas in England we go on in the same clumsy manner as did our forefathers 50 years ago. In France the beet-root juice is treated for sugar, the "vinasse" is fermented and distilled for alcohol, and the spent wash left in the still evaporated, and the potash salts recovered from it.

Worcestershire Sauce.—The will of the late Mr. J. D. Perrins, of the firm of Lea and Perrins, of Worcester Sauce fame, was proved at Worcester last week, and the personal estate, says *Truth*, amounted to £665,000, the whole of which is bequeathed to his widow and children.

Phosphate Mining.—Recent developments make a revival probable of phosphate mining on a large scale in Burgess township, Ontario. Hitherto few pits have been more than 49 or 50 feet deep, but a short time ago the purchasers of the Old Anthony mine determined to sink one of the pits to 120 feet, and to drift 100 feet each way. Now, says a Perth newspaper, at a depth of 100 feet they have struck a face of beautiful phosphate over five feet wide, and about 200 tons have already been taken out of it. There are about 45 men at work on the Adams lots, on Otty Lake, for the Anglo-Canadian Super-phosphate Company. They have put up a large boiler with machinery, and also intend to sink deep. The success of those deep workings will probably lead to renewed mining, as there are abundant phosphate properties which only require capital for the proper development.

Erection of Petroleum Tanks in Stettin.—Our Berlin correspondent informs us that the Russo-German Naphtha Import Company of that capital, which intends erecting a large petroleum establishment in Stettin, comprising tank and all necessary machinery, has just purchased the so-called "Stevenson's plot" of ground on the right bank of the Oder, opposite Bredow, which has hitherto been used as a coal depôt. It is said that the necessary consent of the Government has been obtained, and as the piece of ground in question is situated on an artificial island there can be no danger to ships navigating the Oder.

Alteration of Dues.—The Mersey Docks and Harbour Board have directed that the following alterations be made in the dock rates and town dues on the under-mentioned articles, viz.:—Foreign—Dock Rates and Town Dues: Oxide of iron for smelting purposes only, inward 3d. per ton, outward 1½d.; oxide of iron for other purposes, inward 1s., outward 6d.; Venetian red, inward 1s., outward 6d.; paints and painters' colours and materials not otherwise rated, inward 2s., outward 1s. Coastwise—Town Dues: Oxide of iron for smelting purposes only, inward ¾d. per ton, outward ¾d.; oxide of iron for other purposes, inward 3d., outward 3d.; Venetian red, inward 3d., outward 3d.; paints and painters' colours and materials not otherwise rated, inward 6d., outward 6d.

Petroleum in the Argentine Republic.—One of our South American correspondents, writing from Buenos Ayres, informs us that the petroleum company in Mendoza is continuing the borings which were started with so much success. The Russian geologist who directs the works intends to reach a depth of 200 metres. Several layers of petroleum have already been traversed, and a slight analysis showed the presence of 4 four per cent. of paraffin of excellent quality.

Notes from Scotland.—The directors of the Milbay Soap, Alkali, and Soda Company Limited, at their thirty-first annual meeting just held, have declared a dividend of 5 per cent., amounting to £2,300, and writing off from the plant £300, and carrying forward £123 to the next account.

Russian Trade and the Abolition of the Free Port of Batoum.—According to our Moscow correspondent it would appear that Russian Trade in the Trans-Caspian territory and Asia has already greatly improved since Batoum has ceased to be a free port and the transit regulations have been modified. Only a short time ago Tiflis was crowded with goods of entirely foreign origin; now it is stocked with Russian and Polish manufactures, and it is even asserted by the merchants of Batoum and Tiflis that the products of the industry of the Czar's subjects have penetrated as far as Erzeroum, Trebizond, Sinope, etc. The goods manufactured specially for Asia in Moscow and Ivanovo give general satisfaction, more particularly as far as chintzes are concerned. Most of the transit merchants have retired, or are devoting themselves to banking, as they do not consider the trade *with home manufactures sufficiently profitable.*

Sugar Bounties.—We learn from Berlin that the Sugar Tax Bill submitted to the Federal Council fixes the import duty, from August 1, 1888, upon syrup and molasses at 15 marks per hundred kilograms, and upon all other sugars at 30 marks per hundred kilograms. The tax on beetroots is fixed at one mark per hundred kilograms, and on beetroot sugar of home manufacture 10 marks per hundred kilograms. Further, from August 1, 1888, an export bounty of 10 marks per hundred kilograms will be paid on raw sugar, for other sugars there will be paid from August 1 to September 1, 1888, bounties ranging from 21m. 50 to 20m. 15, and after September 1, bounties ranging from 12m. 50 to 11m. 70 per hundred kilograms.

Sources of Petroleum in India.—A correspondent in Calcutta states that petroleum is found in many places in the neighbourhood of Khatoum. Sources of this article have been found at a depth of 19 metres, 28 metres. 35 metres, 38 metres, and 41 metres. The oil is very thick, glutinous, and dark, and emits a strong sulphurous odour. Boring operations were performed by way of experiment in another locality with the result that by means of an English pump of two inches and at a depth of 117 metres, 5,600 gallons of oil were extracted in thirty-six hours, and at a depth of 157 metres 400 gallons were found in twenty-four hours. The Indian railways are making experiments with a view of ascertaining whether petroleum could be used as fuel for their engines.

The Indigo Trade in India.—A Calcutta correspondent says that one of the most remarkable features in the indigo season which has just come to a close was the strong demand for America, nearly 10,000 chests having been taken to that country. Russia purchased much less superior indigo than formerly, a fact which explains the fall in the price of the better marks. France took its usual quantity, but Germany much less than formerly. On the contrary, on account of the favourable price of average and superior qualities, London has bought much more than was expected. The general fall in prices is attributed to the considerable increase of production in Java, which has in a great measure met the wants of Holland. The indigos of Purneah and Bhangulpore were of an inferior quality. The Behar marks (principally from Chupra) were above the average, while that of Benares was below it.

Artificial Manures.—Some manufacturers do not know what to do with their salt-cake. Messrs. Pilkington, of Widnes, think it better not to make it at all, but to turn their sulphuric acid to other uses. They seem not to have found an El Dorado in the new manufacture, however, as superphosphate of lime has come down in price to 36s. per ton for 24 per cent since they have started to manufacture it.

Disinfecting Powders.—Buyers should be put upon their guard against some very cheap lines of so-called carbolic acid disinfecting powders. Some of these are really made from the uncrystallisable carbolic obtained during the manufacture of crystal carbolic acid, while other varieties are simply hydrate of lime mixed with ordinary coal-tar creosote. Sixteen hundredweights of hydrate of lime costing ten shillings, and 40 gallons of coal-tar creosote at one penny per gallon, will make a ton of disinfecting powder, of the rosiest hue imaginable.

Gas Power.—The Gasmotoren Fabrik at Deutz have recently made a very successful trial of a double-cylinder Otto engine which gave a brake power of about 60 horse-power when driven with Dowson's fuel-gas. They are now making a four-cylinder Otto engine which will not only develop over 100 horse-power effective, but will have an impulse at every stroke. It will thus be seen that a considerable advance is being made in the sizes of gas engines now that Dowson's gas has been proved suitable for them, with a lower fuel consumption per horse-power than is possible with steam engines of equal power.

Dividends.—The Rio Tinto Company invite holders of share warrants to bearer to present coupon No. 17 for the dividend of 2s. per share to be paid on the 26th inst.

MINING ROYALTIES ABROAD.

(From the *Manchester Guardian.*)

Acting upon the suggestion of Mr. Philip Stanhope in the House of Commons in September last, the late Earl of Iddesleigh addressed to several of Her Majesty's representatives abroad a despatch instructing them to collect inquiries on the important subject of State and private ownership in mineral deposits, and the royalties and rents paid in consideration of the privilege of extraction from beneath the soil. The replies to this circular have now been issued as a Blue-book from the Foreign Office. It will be remembered that much information on the subject had been given, before Mr. Stanhope's request, in interesting reports by Lord Vivian and Mr. Crowe on the mining disturbances in Belgium and France last year. Those reports and the present publication combined present a complete survey of the conditions under which mining industries are carried on in Europe and the United States, which is likely to prove particularly useful at a time when the question of mining royalties in this country is being somewhat anxiously considered.

In France, in pursuance of a law passed in 1789, and made still more absolute in 1810, all mines are the property of the nation, and even the owner of the soil cannot open a mine without first obtaining a concession for that purpose from the State. Such a concession constitutes a new property quite distinct from the surface ownership. The right thus conferred is perpetual and transmissible. But on the other hand, no person can try for minerals or work mines without first paying an indemnity to the surface-owner The payments to the surface-owners are regulated by the terms of the concession. When the interests of the landowner as a cultivator are likely to be permanently damaged, the concessionaire must buy the land for a sum not exceeding double its value before the occupation for mining. In other cases permanent rents have to be paid, which vary considerably, being either proportionate to the output, fixed, or partly fixed and partly proportionate. In the valley of the Loire they are said to be equivalent to from 4¾d. to 6¾d. per ton of coal extracted. In the basin of the Aveyron they are much lower. Where the rent is proportionate to the output the fraction paid is smaller according to the depth of the mine. Thus, it is one-sixth of the output for a seam 50 metres below the surface, and only one-twentieth for a seam 300 metres deep. There are large coalfields in the north, on the Belgian frontier, which pay no rent at all to the surface-owner. As a general rule the surface-owners are entitled to a special rent for the land covered by the surface plant of the mining company, in addition to the rent for the area of the concession, or, in other words, for the coal deposit itself. Fixed rentals for the area of the concession are much more common than proportional ones, and the great majority are only ¼d. to ½d. per acre; in the case of some of the salt mines they are upwards of £5 per acre. The rental for the anthracite coal deposits of the Hautes Alpes is 1d. per acre and 2 per cent of the value of the output. The important point is that all such rentals must be registered in the original act of concession and approved by the Government. The State has also a direct financial interest in the produce of the mines, as every concessionaire must pay to the National Treasury a yearly rent of 10f. per square kilometre, and 5 per cent of the net profit of the mine. A small levy, equivalent to ½ per cent of the profit, is also made by the Government to form a relief fund against accidents. It will be seen, therefore, that though the rentals paid to the surface-owner are theoretically an indemnity for possible injury to his interest in the surface, they practically recognise him as in some sense a joint owner with the State in the minerals below the surface, his ownership diminishing according to the depth at which the minerals lie. In Belgium the mining laws were practically the same as the French laws until 1837, when they were modified in favour of the surface-owner, who was considered to have been unjustly treated. The same principles, however, were retained. The State and the surface-owner are each entitled to a fixed rental and a proportionate rental or royalty, those payable to the surface-owner being settled according to the circumstances when the concession is granted by the State, which has the power to expropriate the surface-owner in the interest of the mine. The maximum limit of the fixed rental which may be granted to the surface-owner is not stated in the law, but it is decreed that the minimum shall not be less than 25c. per hectare, or say ¾d. per acre, while the proportionate rental can in no case exceed 3 per cent of the net product of the mine. The fixed payment to the State is 10f. per square kilometre, and the proportionate payment may be assessed annually within a maximum limit of 5 per cent of the net product; at the present time it is equivalent to 3⅓ per cent. of the net product.

(To be continued.)

SOME CHEMICAL PATENTS OF 1886.

I.

Early in the year 1886 the first chemical process of any note for which application was made for protection was that of Messrs. Parnell and Simpson for the production of carbonic acid. In this process the object is to obtain substantially pure carbonic acid for use in the alkali process with which these inventors are identified. This invention is based on the fact that ammonium monocarbonate solution absorbs carbonic acid when cold, but gives it out more or less perfectly when the temperature is elevated, together with (which must not be forgotten) a notable quantity of ammonia vapour.

Impure carbonic acid, such as that obtained from a lime kiln, is washed in a tower and forced by means of a pump into a carbonator charged with the monocarbonate solution. The bicarbonate crystals which are precipitated are drawn off into a heating vessel, from whence carbonic acid gas passes away in an impure state. This carbonic acid gas is cooled, and after being washed in an acid tower to retain ammonia, is collected in a gas-holder. Another application made the same day by both the foregoing patentees deals with another step in their process. The residual ammonium chloride obtained in the ordinary ammonia process is heated with Leblanc alkali waste, in a similar manner we presume to that carried on in Manchester many years ago by Mr. Peter Spence. In this case, the ammonium sulphide which volatilises is absorbed by water or by a weak ammoniacal solution. The solution of ammoniacal sulphide is now decomposed by substantially pure carbonic acid gas, which forms ammonium bicarbonate and liberates sulphuretted hydrogen. The ammonium bicarbonate is employed in decomposing common salt by the well-known reaction, while oil of vitriol is again produced from the sulphuretted hydrogen. The process is therefore continuous.

This process will soon be at work at Widnes by the Lancashire Sulphur and Alkali Company, and it remains yet to be seen whether the combination of such intricate processes will be profitable.

In the same month Mr. Ludwig Mond obtained protection for a method of obtaining ammonia, and either hydrochloric acid or chlorine from ammonium chloride, by bringing the latter in contact with the protoxide of nickel, or one or several of the oxides of cobalt, magnesium, zinc, copper, iron, manganese, aluminium, bismuth, or other heavy metals possessing similar chemical properties. It is said in the specification that the chlorine is retained, forming a chloride or oxychloride, while the ammonia passes on to be absorbed in suitable apparatus. Now comes the critical portion of the process. After sweeping out the residual ammonia by means of an inert gas, superheated steam is passed through, whereby hydrochloric acid passes off and the metallic oxide is reformed. If chlorine is required, after sweeping out the residual ammonia by means of the inert gas, air, preferably heated to 500° C., or oxygen, is slowly passed through, whereby chlorine is given off, and the metallic oxide reformed. It appears from the specification that when oxides are used, which exist in several degrees of oxidation, it is necessary after each series of operations to pass some reducing gas through the heated chambers containing the oxides to reduce them to the lower state, so that there shall be no loss of ammonia from this cause.

It is believed that Messrs. Brunner, Mond, and Co., of Winnington, have spent a large sum of money in endeavouring to work out the details of this process on a practical scale, but judging from Mr. Weldon's experiments on the decomposition of chlorides, and from those of M. Pechiney also, we must say we are not very sanguine of the results.

Notes and Queries.

Dissolution of Partnership. — The Staffordshire Carbonising Co., Milton, near Stoke-on-Trent, coal carbonisers, May 11.

Recent Sales of Gas-tar.—The Blackburn gas-tar taken by Messrs. J. Hardman and Co. at 45s. per ton until the end of last month, has been relet to the same firm for 12s. 6d. The Derbyshire Chemical Co. are purchasing the Sheffield tar at 15s. per ton.

Free Acid in "Alum-cake" and "Cake-alum."—These two substances usually contain more or less free acid, and its estimation under ordinary circumstances is not an easy task. Bayer, in the *Chemiker Zeitung*, states that the free acid may be estimated by using normal soda solution with Tropæolin OO as an indicator, but the solution to be titrated must not contain more than 10 per cent of aluminium sulphate. After a little practice this process will be found very fairly accurate.

Lectures on Soap Making.—A course of seven lectures on the chemistry of the soap manufacture will be given on Thursday evenings, at the Manchester Technical School, by Mr. George Hurst, F.C.S. The first lecture will be given on Thursday, June 9th, at 7-30 p.m.

Oil and Cannel Company.—A petition for winding-up the Flintshire Oil and Cannel Company Limited was presented by Mr. Lichtenburg, of Liverpool, on April 21st, and was directed to be heard by Mr. Justice North on May 7th last.

Borax.—Here is another use for borax. The new method of curing herrings by the application of boracic acid has proved extremely successful in Norway, and called into life quite a new industry at Bergen. There is no doubt that this discovery will in future be greatly developed.

Another Petroleum Fountain.—On March 22nd last, another petroleum boring at Baku burst forth to a height of over 300 feet. It soon filled up several reservoirs prepared to receive it, and the surplus ran down into the sea. It seems very certain that, ere long, petroleum will be much more extensively used as a fuel than it is now.

Shale Oil Investments.—The values of "oil" investments have materially declined, though efforts have been made to rally them. The prospect of even fair dividends from some of them is very shady, and it is thought in all quarters that things will not be much improved until some of the sickly ones have been weeded out.

Carbonising Works.—The recent rise in the price of benzol, from 1s. 5d. to 3s. 6d. per gallon, does not seem to have made some of the carbonising works very anxious to start again. Buyers will thus be able to see that the cost of producing benzol as a substantive article is much more than they had reckoned upon. The proof of the pudding is in the eating thereof, and we could say a good deal upon this subject if we felt inclined to do so.

Sulphate of Ammonia as a Manure.—It will be remembered that the Nitrate of Soda Association offered a prize of £500 for the best treatise on the fertilising qualities of nitrate of soda, and that this prize was awarded, £350 to a German, and £150 to a Belgian doctor. The German paper has now appeared in print, and is being widely circulated. It is not necessary to state that sulphate of ammonia does badly in the conclusions of Dr. Stutzer. The little book appears under the auspices of the celebrated Professor Wagner, who found out the fact that in some cases the employment of sulphate of ammonia for potatoes is worse than no manure at all.

Sugar Industry.—The splendid sugar works at Silvertown, visited a few years ago at an annual meeting of the Society of Chemical Industry, are now completely idle. They were offered for sale the other day, but not a single bid was made. With this works falls also Newland's alum process for the extraction of the potash from the sugar liquors.

Increase in Comsumption of Coal-Gas.—During the year ending March 25th last, the increase in the production of gas at Rochdale has been nearly 8½ million cubic feet, as against 1,849,000 in the previous year. This gives us some idea of what would happen should trade revive again, and then what would become of our markets for coal-tar products.

A Manchester Law Case.—An action brought by Messrs. Greening, of Warrington, against Messrs. Brunner, Mond, and Co. Limited, for the recovery of the price of certain grinding and dressing machinery erected at the works of the latter, was down for hearing on Friday, the 6th ulto., but before the case was called it was intimated that an arrangement had been made between the parties concerned.

An Asphalt Convention.—We learn from Hanover that a convention of asphalt manufacturers has at last been formed, including the German Asphalt Company. For a long time makers have been nearly ruining each other by heavy competition, and the convention has by no means been established too soon. Under the influence of the syndicate, which is pledged for a number of years, asphalt prices are expected to experience an increase of 30 per cent.

Improvements in Tanning.—A suggested improvement in the process of tanning is mentioned by a foreign paper. It consists in the hides being repeatedly taken out of the tanning pit, and allowed partially to dry. By this means, it is stated, an interchange of the tanning liquors in the hide is effected, for the liquor produced in the hide is driven out, and is replaced by stronger tan. It is claimed, also, that the introduction of the air in connection with the moisture will have a favourable influence on the tanning of the leather.

New Ammonia-Soda Processes.—There is now but little doubt that Dr. Pick's new company will be successful, and that shortly there will be a very large extra output of ammonia-soda in the market. We have also been favoured with the sight of the prospectus of another new concern, which is certain to be successfully floated. We also hear that Messrs. Brunner, Mond, and Co. are about to start a very extensive ammonia-soda works in the United States, so that there seems to be very little chance for the survival of the Leblanc process.

Petroleum in California.—The use of petroleum fuel is extending in this state. For a year or more past the Southern Pacific Company has been using it on some of the ferry-boats with success. The petroleum is kept at a burning temperature by a pipe of hot steam running within the oil-conducting pipe. The oil reaching the furnace is thrown into spray, and burns with great fierceness. The oil is a refuse from the refinery, thick and black, not ignitable until heated to a high temperature. It is brought from Alameda to South Vallejo, and the steamer receives enough in five minutes to last all day. From 500 to 600 gallons are used each day.

Breach of Mines' Regulation Act.—A question of great importance to colliery owners was raised on May 4th in the Bolton County Police Court, where Mr. Herbert Fletcher, proprietor of Ladyshore Colliery, Little Lever, was summoned for a breach of the Mines' Regulation Act. Mr. Fletcher had for some time permitted the use of naked lights in his "Doe" and "Five-Quarters" mines, where gas was known to exist, but justified the practice by the contention that his system of "pack-walling" rendered the mines safe. As the result of proceedings instituted by Chief Inspector Dickinson, an award in arbitration was given requiring Mr. Fletcher to discontinue the use of open lights. This award was confirmed, with some amendments, by the Appeal Court; but Mr. Fletcher had not adopted any other system of lighting, and was now brought before the court by Mr. Dickinson. Several witnesses gave evidence as to the presence of gas in the workings, and the case was adjourned.

[illegible]

[illegible] will [illegible] in [illegible] from time to time [illegible] from [illegible] newspapers of subjects interesting to the trade.

We are [illegible] to give accounts of all [illegible] cases in which chemical experts are employed, so that information concerning such matters will be welcomed.

All communications should be addressed to

MR. GEORGE E. DAVIS

30, GREAT JAMES STREET, MANCHESTER.

CHEMICAL REPORTS

The Holidays, of course, are interfering with all business, and no reliable information can be given as to the ordinary state of trade. That business seem small there would perhaps have been, as may be [illegible] at present holidays in the part of the produce will [illegible] to lower stocks.

THE TAR PRODUCTS MARKET

Benzol keeps steady at 9d. to 9½d. per gallon for 90's [illegible], and 8½d. to 8¾d. for 50's, although it is stated that purchases have been effected at lower rates. Anthracene of good quality is in demand, and 8½d. has been paid for it in the slightly dull [illegible]. We know several manufacturers, however, who are holding for 10d. Carbolic acid has gone to the nail, and only those manufacturers are well off who contracted until the end of the year; 3s. 9d. per gallon is all that is now worth. Creosote, creosote, and naphthalene salts are very dingy. Good anthracene oil from the press and filters at 2½d. can be bought to-day for 3s. 9d. per barrel; creosote at 3d. per gallon at the works; and naphthalene salts are only worth the price of fuel. The Blackburn tar has been taken by Mr. Joseph Hardman at 12s. 6d. per ton.

THE SULPHATE OF AMMONIA MARKET

It may be assumed with safety that the recent decline in price has been primarily due to the machinations of speculators, who, however, have to some extent been supported by the injudicious sales of two or three makers. The latter in accepting unnecessarily low prices compel their fellow-manufacturers to a lower range of values; but considering the low ebb of stocks throughout the country, those producers will act for the best who will ignore the present tone of the market, and wait for the better state of things which must inevitably ensue if sellers will but use ordinary tact, and not precipitate the disposal of what is, for some months to come, but a very small production. It is certain that Continental consumers will have to come in for the bulk of their requirements, and their assertions that the Autumn manuring will be exclusively made with nitrate are only perennial statements of a [illegible] nature, made and circulated with a view to [illegible] of sulphate of ammonia.

LIST.

[illegible] RAW. Apparatus [illegible] from alcoholic liquors.

[illegible] THOMAS FLETCHER and ALBERT CLARE. Improvements in [illegible] for automatically controlling the [illegible] of gas in [illegible] gas burners. May 13.

[illegible] HERMANN BERNSTEIN. Improvements in the [illegible] and apparatus for producing patterns or designs on [illegible] and other fabrics. May 13.

[illegible] JOHN WILLIAM BENNETT and SILAS OTTLEY HOLDEN. Improvements in carbureting apparatus. May 13.

[illegible] JOHANNES [illegible] and ADOLPH MIETHE. An improved magnesium light for photographic purposes. May 13.

[illegible] [illegible] BOSSANYI. Improvements in furnaces for burning pottery. May 13.

[illegible] JAMES [illegible]. Improvements in lamps for lighting and heating purposes. May 14.

[illegible] ROBERT WILLIAM FAIR. Improvements in electrical accumulators and primary batteries, and means for effecting the same. May 14.

[illegible] JOSEPH THOMSON STEEN. An improved form of bank and other cheques. May 14.

[illegible] WILLIAM HENRY BECK. New or improved automatic apparatus for the production of carburetted air gas. May 14.

7068. JAMES MARSH, HARRY PARKER MARSH, and JOHN PARKER MARSH. Improvements in the manufacture of self-hardening steel, and in making tools of the same. May 14.

7071. JOHN BERNHALL. Improvements in or connected with steam generators heated by gas, partly applicable to other heating purposes. May 14.

7072. WALTER JOHN LOMAX and MATTHEW GUTHRIE. Extracting gas, oil, fatty, and other matters from sewage, sludge, and similar deposits, and in apparatus therefor. May 14.

7087. WILLIAM RENNY WATSON. Improvements in the manufacture of sugar, and in the apparatus used in connection therewith. May 14.

7102. JOHN HOWARD KIDD. An improved steam strap or dryer. May 16.

7116. ADOLPH EWER and PAUL PICK. Process of obtaining products of condensation from aldehydes, and the sulphuric acids of the aromatic amines, and also compounds of the same with tetrazo-compounds. May 16.

7119. CARL STEFFEN. An improved process for systematically lixiviating raw sugar by means of aqueous, alcoholic, or other saccharine solutions. May 16.

7120. CHARLES ASBURY. Improvements in the construction of lamps and lamp burners for burning mineral or other oils. May 16.

7123. JOHN FARRELL. Improved means for distributing manure to trees. May 16.

7136. WILHELM LIPPERT. A new or improved process and apparatus for producing bathing waters containing carbonic acid. May 16.

7139. DANIEL EDWARDS, RICHARD LEWIS, and PHILIP JONES. Improvements in apparatus for coating metal plates with tin or other metal. May 16.

7151. STUART BUNTING. Improved moulds, with apparatus attached, for blowing glass by means of compressed air and completing the manufacture in the mould. May 17.

7156. JAMES KEITH. Improvements in apparatus for manufacturing oil gas. May 17.

7174. JAMES PARRY. Improvements for extinguishing the flame of paraffin oil or other lamps to prevent explosion. May 17.

7190. JOSEPH WALLACE. An improved mode of and apparatus for distilling and maturing alcohols. May 17.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
ACIDS:—			
„ Acetic, 25 % ... ... per cwt.	0	10	6
„ Arsenic... ... ... „	0	15	0
„ Chromic ... ... per lb.	0	0	8
„ Fluoric ... ... „			
„ Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
„ „ (cylinder) 30° Tw. ... „	0	2	0
„ Nitric, 80° Tw. ... ... per lb.	0	0	2¾
„ Nitrous... ... ... „	0	0	2¾
„ Oxalic ... ... „	0	0	4
„ Sulphuric (fuming %) ... ... „			
„ „ (Brimstone 168°) ... per ton	4	5	0
„ „ (Pyrites 168°) ... ... „	3	10	0
„ „ (spent oxide 168°) ... „	4	0	0
„ „ („ 150°) ... „	2	5	0
„ „ (Pyrites 150°) ... ... „	2	0	0
„ Tartaric ... ... per lb.	0	1	7
Alum... ... ... per ton	5	0	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
„ = 24° ... ... „	0	0	1¾
„ Carbonate ... ... „	0	0	3½
„ Muriate ... ... per cwt.	1	2	0
„ „ (sal-ammoniac) ... „	36/- & 34/-		
„ Sulphate (grey), London ... per ton	11	17	6
„ „ (grey), Hull ... ... „	11	15	0
Aniline Oil ... ... per lb.	0	0	10½
„ Salt ... ... „	0	0	9
Antimony... ... ... per ton	33	0	0
„ (tartar emetic) ... ... per lb.	0	1	3
Barium Chloride ... ... per ton	7	10	0
„ Carbonate (native) ... ... „	4	5	0
„ Sulphate (native levigated) ... „	3	10	0
Bleaching Powder, 35 % ... ... „	7	12	6
„ Liquor, 7 % ... ... „	2	15	0
Bisulphide of Carbon ... ... „	13	0	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... „	0	5	6
COAL-TAR PRODUCTS:—			
Anthracene, 30 % f.o.b. Goole, per unit per cwt.	0	0	8½
Benzol, 90 % „ ... per gallon	0	3	6
„ 50 % „ ... „	0	2	10
Carbolic Acid (crystalised 35°) ... per lb.	0	1	0
„ (crude 60°) ... ... per gallon	0	2	8
Creosote (ordinary)... ... ... „	0	0	0½
„ (filtered for Lucigen light) „	0	0	1
Crude Naphtha, 30 % @ 120° C. „	0	1	1
Grease Oils, 22° Tw. ... ... per ton	1	7	0
Pitch, f.o.b. Liverpool or Garston ... „	0	11	6
Coke-oven Oils (crude) ... ... per gallon	0	0	0½
„ (distilled) ... ... „	0	0	1
Copper (Chili bars) ... ... per ton	39	5	0
„ Sulphate ... ... „	14	2	6
„ Oxide (copper scales) ... ... „			
Glue ... ... per cwt.	1	17	6
Glycerine (crude) ... ... per ton	33	0	0
„ (refined) ... ... „	52	10	0
Iron (turnings)... ... ... „	1	13	0
„ Peroxide (blue billy) ... ... „	0	6	6
„ „ (bog ochre) ... ... „	1	13	0
„ „ (precipitated ... ... „	3	0	0
„ Sulphate (copperas) ... ... „	1	5	0
„ Sulphide (antimony slag) ... ... „	1	2	0
Lead (sheet) for cash ... ... „	13	10	0
„ Acetate (white) ... ... „	24	10	0
„ Nitrate ... ... per cwt.	22	0	0
Magnesium (ribbon and wire) ... ... per oz.	0	2	6
„ Chloride ... ... per ton	2	5	0
„ Carbonate .. .. per cwt.	1	17	6
Magnesium, Hydrate ... ... per cwt.			
„ Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... . „	19	0	0
„ Borate .. .. per cwt.	2	5	0
„ Ore, 70 % ... ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	4
OILS:—Castor ... ... per cwt.	1	5	0
Cocoa-nut ... ... per ton	26	0	0
Cotton-seed ... ... „	17	10	0
Colza ... ... per ton	24	15	0
Linseed ... ... „	20	10	0
Lubricating, Scotch, 885°—890° ... „	5	10	0
Oleine ... ... „	18	0	0
Palm ... ... „	21	10	0
Petroleum (refined for burning) Russian per gal	0	0	5
„ „ American „	0	0	5¼
Rape ... ... per ton	23	0	0
Rosin ... ... „	10	10	0
Sperm ... ... per cwt.	2	15	0
Whale ... ... „	1	0	0
Silver (metal) ... ... per oz.	0	3	7¾
„ Nitrate ... ... „			
STARCHES:—			
Sago ... ... per cwt.			
Potato (farina) ... ... „			
Rice ... ... „			
Sodium (metal) ... ... per lb.	0	6	0
„ Carb. (refined Soda-ash) 48 % per ton	5	0	0
„ „ (Caustic Soda-ash) 48 % „	4	3	4
„ „ (Carb. Soda-ash) 48 % „	4	3	4
„ „ (Soda Crystals) ... ... „	2	7	6
„ „ (Crystal Carbonate) ... „	5	1	6
„ Chlorate ... ... per lb.	0	0	7½
„ Borate (Borax) ... ... per cwt.	1	7	6
„ Bichromate... ... ... per lb.	0	0	2½
„ Hydrate (76 % Caustic Soda)... per ton	9	12	6
„ „ (70 % Caustic Soda)... „	8	0	0
„ „ (60 % Caustic Soda, white) „	7	0	0
„ „ (60 % Caustic Soda, cream) „	6	10	0
„ Bicarbonate ... ... „	6	5	0
„ Hyposulphite ... ... „	5	5	0
„ Nitrate (95 %) ex ship Liverpool per cwt.	0	11	5
„ Silicate (glass) ... ... per ton	5	10	0
„ „ (liquid, 140° Tw.)... ... „	5	7	6
„ Sulphate (Salt-cake) ... ... „	1	4	0
„ „ (Glauber's Salts) ... „	2	2	6
„ Sulphite ... ... „	5	17	6
Potassium (metal) ... ... per oz.	0	4	0
„ Bichromate ... ... per lb.	0	0	3½
„ Carbonate, 90% ... ... per cwt.	0	19	0
„ Chlorate ... ... per lb.	0	0	6⅛
„ Hydrate (Caustic Potash) ... per ton	23	10	0
„ Nitrate (refined) ... ... per cwt.	1	2	0
„ Prussiate Yellow ... ... per lb.	0	0	7½
„ Sulphate, 90 % ... ... per ton	11	15	0
„ Muriate, 80 % ... ... per ton	9	5	0
Strontium Hydrate, 40 % ... ... per cwt.	10	0	0
Sugar, Beet ... ... per cwt.	0	12	0
„ Cane ... ... „	0	15	0
Sulphur (Flowers) ... ... per ton	9	0	0
„ (Roll Brimstone) ... ... „	5	15	0
Superphosphate of Lime (28 %) ... ... „	1	16	0
Tallow ... ... „	22	0	0
Tin (metal) ... ... „	102	15	
„ Crystals ... ... per lb.	0	0	
Zinc (Spelter) ... ... per ton	14	5	
„ Chloride (solution 96° Tw.) ... ... „	5	12	

A dust collector, made by Gebrüder Seck, in Darmstadt, for removing dust in mills and factories, may be seen at Stand 505 in the machinery department. Obviously it has many other uses than that indicated here. Wilkinson's perforated pulleys—shown at Stand 3508 in the Machinery Section and at 934 in the Chemical Section—deserve careful attention by those in charge of machinery in chemical works.

We now pass to those appliances which may be strictly termed laboratory apparatus. Mr. John Heywood exhibits a very good rig-out in the way of laboratory woodwork and fittings, but it is unnecessary to notice this any further, except that it is the starting point at which we have to commence.

Messrs. Mottershead and Co. and Messrs. James Woolley, Sons, and Co. exhibit some chemical and physical apparatus of various descriptions, but as nearly the whole of the glass-work generally supplied by dealers is of German origin, we shall not give a more minute description here, preferring to more fully notice the very excellent collection of glass and other work sent from Bonn by Herr Franz Muller the successor to Dr. H. Geissler.

The manufactory of chemical apparatus carried on by Herr Franz Müller is generally known as the Geissler Institute of Bonn, and the exhibits at Stand 713 in the Chemical Section deserves special attention on the part of analytical chemists. There are here exhibited a great many new instruments, the delicate glass-work of which must certainly excite the admiration and curiosity of all visitors. We name here several of the exhibits in order to show that most classes of scientists may find something of special interest in this show-case.

Amongst some suites of apparatus for the illustration of lectures in physics and chemistry may be found Geissler's mercury air-pumps; one is fitted up with a desiccating apparatus and two receivers for the analysis of blood-gases. The Geissler pump is an indispensable apparatus for electric light companies. The Jablochkoff Company of St. Petersburg, for instance, works with this kind of evacuating apparatus. Of still more common interest are several Crookes', Geissler, and Puluj apparatus, especially Crookes' new form containing rhombs of phosphorescent minerals giving most brilliant effects. There is also to be found here a set of standard chemical thermometers, representing together the scale from $-10°$ C. to $+360°$ C.; each degree is divided into fifths, and they are specially suited for working with small quantities of liquid, as they are very short and thin. There is also to be found a series of controllable medical thermometers with the 0° point graduation, invaluable to the physician as a means of easily checking the correctness of his fever thermometers. Amongst other pieces of apparatus is an hypsometer, baro-thermometer, the thermometer of which is divided into the hundredths of a degree. This extremely sensitive apparatus marks differences in height of less than two metres. The vaporimeter of Dr. Geissler—so well known abroad, but so little known in England—for the determination of alcohol in wine, beer, and vinegar, finds a prominent place in this show-case. For manufacturers of sulphuric acid, aniline, manure, gunpowder, dynamite, peroxide of hydrogen, and others, we see Lunge's nitrometer exhibited, and alongside stands Bunte's gas burette, and a series of others, notably those of Hildesheimer: there are also pipettes, graduated jars, cylinders, flasks, etc., which do not differ however from those in ordinary use.

Very interesting as specimens of intricate glass-blowing are the Norblad apparatus for the preparation of hydrogen gas, and Brögger's species of separating funnel for the petrological experiments of mineralogists. There are also exhibited three series of Geissler stop-cocks, of various forms and sizes; Pflüger's litre flasks, for mixtures or dilutions of liquids; Bennert's desiccator and manometer, with stop-cocks and movable looking-glass scale; and, lastly, there are some indications that metal work is not forgotten in this factory. There are shown some chemical vessels in pure nickel—evaporating basins, crucibles, tongs, spoons, spatulas, etc.—and also Prof. Arzberger's gas regulator of nickeled brass. The ordinary thermometers, aërometers, pycnometers, etc. of the Geissler Institute are sufficiently well known to need no description, and in closing this description we feel sure that all chemists will find the contents of this case to be of more than general interest, and we are also tempted to ask why this industry should be so totally neglected in this country?

(To be continued.)

CHEMICAL EVIDENCE IN THE CONDY'S FLUID CASE.

Towards the end of May last the action of "Condy and Mitchell *v.* Taylor and Co." was taken before Mr. Justice Kekewich. Mr. Aston, Q.C., Mr. Warmington, Q.C., and Mr. John Cutler represented the plaintiffs; and Mr. Barber, Q.C., and Mr. Cross, the defendants.

The action was for an injunction to restrain the defendants, who are wholesale grocers at Swansea, from infringing the plaintiffs' registered trade-mark of "Condy's fluid," and from selling as "Condy's fluid" any disinfecting fluid which was not of the plaintiffs' manufacture.

The case was briefly as follows:—On the 17th July, 1885, Messrs. Taylor and Co. wrote to the plaintiffs in London, ordering 50 gallons of crimson fluid and 12 dozen bottles of green fluid. There was some correspondence about the price, and on the 22nd July the defendants wrote complaining of the non-delivery of the disinfectants, saying that the demand had fallen off, and as they would lose money some allowance should be made. A 50-gallon cask was then specially prepared, and the goods sent by rail to Swansea. Soon after complaints reached the plaintiffs that bottles like theirs were being sold containing a fluid which was not the plaintiffs'. "Condy's fluid" might be tested in a very simple way. Certain oxidising agents were employed in the manufacture of the fluid, and it was known to most chemists that by testing the oxidising power of the samples it could be determined whether they were genuine or not. By taking the genuine "Condy's fluid" and the pseudo-"Condy's fluid" and testing them with iron, a skilled chemist could say by the result which was the genuine and which was the pseudo. The customers at Swansea probably did not apply any scientific test, but they determined the matter by the rough and ready test of strength and colour. The plaintiffs being put on inquiry sent an agent down to Swansea and purchased some bottles at the defendants' shop. On the contents being analysed, it appeared that so far from being of the right strength, it took 23 volumes, or parts, in one case, to produce the result of 9 parts of the plaintiffs' fluid; in another, 18 parts to produce the result of 9; and in another, 235 parts to produce the result of 100.

There was no dispute as to the fact of the defendants having put the plaintiffs' registered trade-mark, "Condy's fluid," on their bottles. On the 20th September, the plaintiffs' solicitor wrote to the defendants, pointing out what they had done, requiring an undertaking from them as to the future, the delivery up of all labels in their possession, and the withdrawal of all the bottles so labelled and containing the fluid complained of, and the payment of legal expenses incurred. Messrs. Taylor wrote saying they had only four bottles left, which were in use in their own stables, sent the labels, and asked what the legal charges would be. The plaintiffs' solicitors replied, twenty guineas. This ought to have put an end to the matter, but the defendants consulted their solicitor and refused to pay the money, and the writ was issued shortly afterwards.

The defence was simply that the defendants had purchased a 50-gallon cask of the fluid from the plaintiffs for a corporation contract which afterwards fell through. After keeping it for twelve months it was bottled off, and sold without any mixture or adulteration, evidence of which was given by Mr. James Price, the defendants' warehouseman, and Mr. James Henry Leek, the defendants' general manager.

For the plaintiffs, Mr. William Morgan, analytical chemist and assayer, of Swansea, stated that in August 1886 he received instructions, and procured some bottles of Condy's fluid sold by the defendants. He tested the bottles marked

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this fluid reduced the
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fluid.

IN BRITISH OIL MANU-
ACTURE.

(Journal of Commerce.)

of enormous natural oil deposits in
world have already exercised a marked
trade. Baku, the Russian province,
to supply the whole consumption of the
is not for the charges incident to transit
hipping freights, warehouse expenses, and
drawbacks. As it is, Baku is at the present
undeveloped and in its complete infancy, a
rival to the vast oil regions of the United
when the "pipe lines" and pumping stations are
and in full working trim, and when the specially
steamers, with their specially contrived tanks capable
millions of gallons of oil, shall be running, who
what the trade in oil will be capable of? Then,
are the Egyptian discoveries, which, if they do
those of Baku, certainly open up almost illimitable
for a large and increasing commerce in oil. But
all; recent and very important discoveries of most
oil deposits have been found to exist in various
of our Indian Empire, and from here, again, an
us output will ere long take place for the supply of
uirements of the East. It may interest our readers to
hat at home holders of oil are about to abandon the
methods of storing oil in barrels and warehouses.
ous oil tanks will be constructed on the banks of the
, and no doubt elsewhere, into which the oils will be
from the hold of a steamer or a sailing vessel direct
eceptacle on shore, and a moment's reflection on the
any practical person will at once show what a vast
this means. Turning our face towards home pursuits
manufacture, a very sad state of affairs presents itself
view, and we most *sincerely commiserate* the Scotch producers on the hard times upon which their lot has fallen. If ever a body of men deserved to be well rewarded for perseverance and a gallant effort to build up a prosperous and permanent home industry, surely they are to be found in the Scotch shale oil manufacturers and the shareholders in ...ous companies who have courageously and persistently ...them. But unfortunately matters have turned out ... What is the reason of all this disaster? ...ters and authorities (and amongst them our ...guarded contemporary *Economist*), it is due to ...tion. This is true enough; but the misleading ...ertion lies in the fact that if markets were open ..., and our foreign rivals had to pay an import duty, ...ch friends could not possibly produce too much or ...eighth enough for home consumption. It is, as we say, ...ere foreign competition dominating in a large degree many more home industries and manufactures than we care to admit, and it is slowly but surely undermining many sources of national wealth. Even our "own flesh and blood" in Canada are endeavouring to put prohibitive duties on the admission of iron into the Dominion, and yet we go on allowing the foreigner to attempt to strangle us in everything. It is bad enough when our colonies try to do it, but it is "playing too low" to permit foreigners to have the slightest opportunity of adopting a one-sided game. There have been very heavy falls during the past few weeks on the Glasgow Exchange and elsewhere in oil shares, in fact amounting to over one-half of the actual realisable capital involved; and to talk about "rigs" in the market or "possible economies in manufacture" is to simply talk nonsense in the face of a great disaster. Let us take the chief Scotch oil companies, and the cogency of our remarks will appear at a glance:—Current price of Brockburn Company's Shares 11½, in 1866 same time 22½, fall 11; Burntisland 7½, 15⅝, fall 8½; Cluppins (old) 4½, 9⅛, fall 4⅝; Cluppins (new) 2⅝, 7½, fall 4⅞; Dalmeny 15, 22 1/16, fall 7 1/16; Holmes 3¾, 4½, fall ¾; Linlithgow 2¾, 8⅝, fall 5⅞; Pumpherston 4, 7⅛, fall 3⅜; Walkinshaw 5/16, 5/16, equal; West Lothian 4, 5⅛, fall 1⅜; and Young's 2½, 9, fall 6½. Now, it is no use blinking these facts. Scotch investors and Scotch oil people have been very hardly hit, and they are likely to be hit still harder unless they will be up and doing. A national industry is threatened with extinction, and it has passed through calamity enough in every way during the last twelve months. Large capitals have been sunk in works, machinery, and plant, and our people require employment. The lesson must be taken to heart, and a remedy through agitation and legislation must be quickly brought about, or it will be "too late!"

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

(Continued from page 11.)

AFTER the date of Dunlop's second patent (Nov. 22nd, 1855), John Barrow, Junr., obtained provisional protection for the use of manganese or any of its several oxides as a substitute for lime in the ordinary decomposition of sulphate of soda in the black-ash furnace, and of the sulphuret of manganese so obtained for the production of sulphurous and sulphuric acids. The sulphuret of manganese after roasting was to be used again in the manufacture of chlorine. We are of opinion that the decomposition of salt-cake, with coal and manganese oxide, would present too many difficulties to be carried out in the ordinary way, and much research would have to be made upon the many reactions and complications which would inevitably take place before this process could be pronounced a feasible one.

In the next year the same patentee obtained protection for certain improvements on the above process, and also coupled with them the process for the decomposition of chloride of manganese by means of a current of dry oxygen gas ... atmospheric air, with the assistance of heat, into free chlo... and oxide of manganese. Since this date the fore... process has seemed a likely one to many inventors, ...

one has yet been able to overcome the physical and mechanical difficulties which hedge round the process.

In April, 1856, we have evidences that the process of manganese recovery was being experimented with by the application of George Elliott and W. W. Pattinson for provisional protection for their invention of using weak acids to dissolve off the protoxide and leaving the peroxide. In those days this was not such a senseless operation as it appears to-day. Then, the acid from salt-cake pots only was collected for use in chlorine making, the roaster or furnace acid being in most cases too weak to use in the ordinary way, but it would act upon the protoxide of manganese as mentioned in the specification. Another portion of the specification shows us clearly that the method of precipitation and agitation with air, as proposed by Gossage, was perfectly well known to the trade. In this specification it is stated that any known method may be adopted for precipitating a protoxide from the chloride of manganese produced in the manufacture of bleaching powder, but lime is preferred as the cheapest, and such protoxide was to be converted by any known methods into a mixture of protoxide and peroxide, but the process preferred was to expose it with agitation to the action of the atmosphere.

There is no doubt that many experiments were made upon these processes from time to time, as in October of the same year, George Elliott obtained letters patent for a process for the purification of chloride of manganese from iron by protoxide of manganese, and the recovery of a mixed protoxide and peroxide from the chloride of manganese. In this process the iron was precipitated in the chloride of manganese solution by means of carbonate of lime, and the resulting liquor gave protoxide of manganese on treatment with lime. This was then used to precipitate the iron from the bulk of the waste manganese liquors.

In the same month as that in which the last process was evolved, Hugh Lee Pattinson obtained provisional protection only for a process in which chloride of manganese in solution in water was precipitated with lime, and the resulting protoxide of manganese, after being washed and dried, was exposed to a cautiously regulated heat, by which means the precipitate contained a much larger proportion of peroxide of manganese that it originally contained, "so much so as to render its application useful in the arts." A process very similar to this was working for many years at a well-known alkali works.

Later in the same year William Gossage obtained letters patent for processes aimed at the recovery of manganese in waste liquors as a carbonate, and for the use of this carbonate in the soda manufacture. From a practical point of view the processes described in the specifications were but modifications of the processes of Dunlop and Barrow, save that carbonate of magnesia was spoken of as one of the active agents.

The year 1856 seems to have been a very interesting one so far as manganese recovery was concerned. In December, E. K. Muspratt and B. W. Gerland obtained provisional protection only for a process of treating waste liquors in the manufacture of chlorine. In this process, carbonate of lime was first added to precipitate the iron, and the solution afterwards treated to recover nickel and cobalt. The manganese was to be separated from its solution by means of lime, and the precipitated protoxide converted into peroxide and used again in the manufacture of chlorine. Improvements on this process were again patented in June, 1857, by both the foregoing patentees, but it does not appear that anything more than the use of vat or soda-waste was intended.

In August 1857, F. A. Gatty proposed to form peroxide of manganese by heating the sulphate or chloride with nitrate of soda or nitrate of potash, to dull redness and collecting the nitrous vapours which were evolved. Nitrate of soda will have to be very cheap before such a process as this can ever become commercially successful.

The patent taken out in July, 1858, by Edward Haeffely may be taken as a distinct advance over most others that had gone before. In some respects it differed but little from H. L. Pattinson's process of 1856, and from Elliott and Pattinson's of the same year, but we find in it an indication that the process had been very carefully worked at, as the description of detail accords with our manufacturing experience of to-day. The liquor from the chlorine stills was first neutralised with limestone or chalk, and then boiled with the same ingredients to throw down the iron which the liquors contained. To the clear liquor two equivalents of caustic lime were added for every equivalent of manganese present, and the precipitate, after being washed and dried, was heated to low redness in a closed or muffle oven. The regenerated manganese was then lixiviated with the refuse liquor from the chlorine stills, by which treatment lime was removed, and the manganese in a high state of oxidation remained. At one alkali works this process was carried out in its entirety for some years, and we have some of the manganese in its various stages in our possession, containing in its finished state over 66 per cent of $Mn\ O_2$.

Matters remained quiet in the way of manganese recovery till 1860, when Christopher Binks and John MacQueen essayed to recover the manganese from waste chlorine liquors, in a specification for which provisional protection was accorded them on May 19.

(To be continued.)

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday Morning.

The market continued sluggish during the whole of last week, with works on slightly abated production, and present indications favour the view that this week there is to be no very marked mending. With the exception of bichromates, quotation changes have been more or less inclined to the fall, and some of the old figures are a fraction down, with still not very much business carried through. Bichromate of potash and bichromate of soda, the British make of which is mainly confined to Scotland, and the prices of which have been quite stationary for the last four or five years, both rose within the last fortnight in obedience to a concerted decision on the part of the combined makers, the price for the former being now 4½d. per lb. less 5 °/₀ f.o.b. Glasgow, and for the latter 3½d. less 5 °/₀. This amounts to a rise of one penny per lb. on each. It remains a question whether the advance can be maintained, and inquiry meanwhile being confined to consumptive needs the output is on a restricted basis. Some makers of bleaching powder ask fully £8 delivered f.o.b. Glasgow, but business is done at less. Current general prices are—Soda crystals, 42s. 6d. to 45s. net Tyne; alum (lump), about £4. 10s. to £4. 15s., less 2½ °/₀ Glasgow; borax, English refined, £31, and boracic acid £46 to £46. 5s. net Glasgow; soda ash (48/52°), 1d. °/₀ per cwt., less 11 °/₀ Tyne; caustic soda, £9. 10s., less 2½ °/₀ for 76° white, to £6. 10s. for 60/62° cream, Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 10s. Tyne net; 48/52° refined alkali, 1¼d. °/₀ per cwt., less 11 °/₀ Tyne; salt-cake, 22s. 6d. to 25s.—all for the most part weak, with, perhaps, bleaching powder and the last-named (salt-cake) as the nearest two exceptions. Apart from sulphate of ammonia, which is still fairly healthy, and just now sells pretty freely at a fraction under £12 per ton f.o.b. Leith, the products of the great Scotch shale industry continue excessively depressed, paraffin scale (hard) at from 1½d. to 1⅝d.; 120 wax (semi-refined), 2½d. to 2⅝d., and paraffin spirit 4½d. to 5d. The officials of the various concerns have met together for the purpose, if possible, of devising a remedy for the low position of scale particularly, but of practical outcome there is none as yet.

THE MINERAL AND COLOUR MARKET.

(From *Geo. G. Blackwell's Report.*)

Minerals.—There is a better inquiry to report this week. Manganese is firm for forward delivery, but spot sales are few. Magnesite (containing 98 per cent carbonate of magnesia) continues without change. Raw lump still continues to offer freely at 30s. to 35s.; raw ground, £6. 10s.; and calcined ground, £12. Bauxite (Irish Hill quality) con-

times in increased demand: Lump, 20s.; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk is quiet, but prices are unaltered at 85s. to 95s. for medium, and 97s. 6d. to £5. 5s. for best G G B. Barytes continues scarce, and prices are firm, especially for best qualities. Carbonate: Lump qualities still very scarce. Finest selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, G G B brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone continues in demand; ground, £7; specially selected lump, finest quality, £10. 10s. Iron ore quiet. Purple ore, 7s. to 9s. Emery-stone steady at £5. 10s. to £6. for lump; smalls, £5. to £5. 5s. Fluor and felspar steady. Fullers' earth unaltered; (Emerald brand), best lump, 50s.; fine impalpable ground, £7. Wolfram and tungstate of soda in demand, but prices are unchanged. Tungeten metal is unaltered at 2s. 6d. per lb. Tungsten alloy 2s. per lb. Chromo ore: There is better inquiry, 80s. to 85s. being quoted for 50 per cent, and 60s. for 40 per cent. Antimony ore, £8. to £10 for fair quality; best, £18. 10s. Antimony metal, £31. to £32. 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £18.; brown grades, £14. to £15. Potter's lead, £11. to £12. Calamine, 60s. to 80s. Strontia remains steady; sulphate (celestine), 19s. to 20s. Carbonate (native), £15. to £16.; powdered (manufactured), £11. to £12. Plumbago: Best Ceylon lump, £25. to £35.; good, £20. to £21.; chips, £8. to £16; best ground, £20., £25., and £30.; other qualities, £5. to £15. per ton. French sand, 18s. to 19s. Ferro-manganese, 80 per cent, packed, £11. 2s. 6d.; 70 per cent, packed, £10.; 60 per cent, packed, £8. 16s.; 50 per cent, unpacked, £7. 15s.; 40 per cent, unpacked, £7. 5s. Speigel, 20 per cent, £4. 12s. 6d. Silicon speigel, 9 per cent, £8. Chrome pig, 9 to 10 per cent, £8. to £8. 10s. Bitumen, finest picked, £35; original prime, £18. to £23; good, £8.

COLOURS are quiet. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £17. Red lead, £16. Oxide of zinc: V.M. No. 1, £19. 10s.; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared smalt, 8s.; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24.; ditto lb. jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

Notes and Queries.

MINERS' WAGES.—At a largely attended meeting of the West Lancashire Coal Association, held yesterday at the North-Western Hotel, Liverpool, Mr. Alfred Hewlett in the chair, it was resolved that a reduction in the wages of the colliers was absolutely necessary, and a committee of masters was appointed to meet the men's representatives on the subject.

IS BELGIUM PLAYED OUT?—With reference to the labour troubles in Belgium, a Brussels telegram says that the mechanics and metal workers in that city have commenced a strike. They have no grievances against their employers, but wish for universal suffrage, an amnesty, and a rejection of the Cattle Duty Bill. The metal workers of Louvain and Centre have struck. The joiners, tailors, and house painters of Brussels have also decided to strike. The colliers' strike will, it is expected, terminate at the end of this week. At the meetings of women much exasperation is expressed. In the Liege district the strike is at an end.

GOLD DISCOVERY IN NORTH WALES.—It was reported the other day that pieces of gold have been discovered by miners in the bed of the river Mawddach, North Wales, and investigation seems to confirm the statement that the bed of the river is impregnated with gold, which has probably been washed down from the hills.

REDUCTION IN DUES.—The Mersey Docks and Harbour Board have directed that in future the following dock rates and town dues be charged on agalite, a silicate of magnesia, viz.:—Dock rates and town dues, inwards, foreign, 1s. per ton; ditto outwards, foreign, 6d. Town dues, inwards, coastwise, 3d. per ton; ditto outwards, coastwise, 3d.

THE COAL SHIPPING TRADE.—A return just issued shows that the quantity of coals exported from the United Kingdom to foreign countries and British Settlements abroad during 1886 was 22,107,144 tons, while there was brought to London coastways 4,671,127 tons, and by rail and inland navigation 7,141,036 tons; and the quantity received at other ports of the United Kingdom coastways was 8,301,636 tons. The quantity of cinders exported was 650,311 tons. The quantity of patent fuel exported was 525,934 tons; brought to London by sea, 21,110 tons; and to other ports by sea, 7,552 tons.

A NEW GOLD FIELD.—The Russian papers announce discoveries of gold deposits of extraordinary richness in a part of Eastern Siberia not hitherto explored, at some distance from the town of Jakoutsk. The Government has despatched experts to ascertain the truth of the reports received at the Ministry of Finance, which speak of the region as a veritable new California.

PARAFFIN OIL COMPANY.—The directors of Young's Paraffin Light and Mineral Oil Company have issued a statement to the shareholders regarding the condition of the company. They say they regret to announce that, after debiting to revenue £15,785 for maintenance, £21,434 for interest on debentures and borrowed money, and £18,231 in reduction of value of stocks in hand, equal to £56,450, there is a debit balance on the year's working of £38,326, without any capital depreciation written off. They state that the cause of this unsatisfactory state of matters is the great depreciation in the value of all productions made by Scotch oil companies. In a circular accompanying the statement, the managing director of Young's Company suggests that in order to cope with the difficulties which have arisen, the value of the shares should be considerably reduced, and that new capital with which to pay off debenture stock or other debts of the company should be raised.

THE DANGER OF STORING PARAFFIN OIL IN BARRELS. The Manhattan Wharf, the property of Messrs. W. Simpson and Co., West Silvertown, London, used for the storage of empty and full paraffin barrels, was, on the night of the 10th inst., the scene of a most destructive conflagration. The wharf is surrounded by a number of buildings in which manufactures of a dangerous nature are carried on, and is connected by a wooden subway and a pier with Messrs. Knight's soapworks and a large sugar refinery. The paraffin barrels, about 45,000, were in three tremendous stacks. The fire, which originated in the wooden subway, soon destroyed this, and before the first fire engine arrived one stack of oil-sodden barrels was ablaze and the subway and pier were burning. The work of extinction was a most dangerous and difficult one, but by the morning the fire had been driven to one end of the stack. Ten thousand barrels were destroyed.

MAURITIUS SUGAR EXPORTS.—Mauritius advices under date 5th May tend to show that the next crop of sugar will not be so large as was forecasted. April was cold and dry, causing vegetation to come to a standstill, while in some parts of the island the canes bear testimony to the sad effects of the drought of 1886. The exports of sugar for the season 1886-7 were 83,329 tons, against 96,920 in 1885-6 and 108,968 in 1884-5. Of the exports 1886-7, 41,897 tons went to Bombay, 14,225 to Australia, and only 4,439 tons coming to the United Kingdom.

THE TAR PRODUCTS MARKET.

The tar products market continues firm, especially in anthracene, for which 10d. is being paid for B quality, and over one shilling for A. Benzols remain much the same as last week, there being but few sellers at the prices buyers seem disposed to give. The tendency is, however, to a rise, and as the present prices have not tempted those carbonisers who were idle to start again, it may be found that benzol is more scarce than the buyers are aware. The new saccharine factory at Salbke-Westerhüsen may cause a large demand for toluene, as it is certain that this article will soon be largely used.

In consequence of the firm character of the benzol market, tar distillers are offering more for tar; we have heard of 18s. being paid recently, and bearing a carriage of 1s. 9d. upon it. Pitch is mending slowly, and 13s. to 13s 6d. is now obtainable at port of shipment. The manufacture of patent fuel is still extending, and much of it is being sent to London.

THE SULPHATE OF AMMONIA MARKET.

The market is very firm for prompt and forward delivery; on Wednesday, as much as £12. 10s. was paid, but we did not get notice of it till late in the day. From London, Hull is only quoted £12. 7s. 6d., but from other advices there is no doubt but that to-day (Thursday) above £12. 10s. has been paid. London outside makes are quoted at £12. 10s., while the price of Beckton has risen to £12. 15s. Leith values are £12. 5s. to £12. 7s. 6d.

THE PATENT LIST.

7494. Percy Carlyle Gilchrist. Improvements in the manufacture of steel or ingot iron by the basic process. May 23.

7495. Percy Carlyle Gilchrist. Improvements in the manufacture of iron and steel. May 23.

7504. Paul George William Typke. The utilisation of by-products resulting from the manufacture or production of certain phosphorus compounds. May 23.

7515. Carl Anton Koellner. An improved filtering and lixiviating press. May 25.

7518. Jacques Belou. A new or improved process for manufacturing pure hydrogen. May 25.

7519. Jacques Belou. Improvements in the treatment of ores. May 25.

7533. Francis Julius Clamer and Joseph Gregg Hendrickson. A process of cleaning, preparing, and coating metal plates and other metal surfaces. May 25.

7550. Edward Burford Petrie and Robert Wild. Improvements in the means and method of, and for the washing, scouring, boiling, and bleaching of fibres, fibrous materials, and textile fabrics, and the stripping of fibres from hides or skins. May 25.

7556. Kenyon Lockwood. Improvements in the method of and means for dyeing yarns. May 25.

7613. Louis Sepulchre. Improvements in lighting and heating by mineral oils. May 25.

7619. Carl Johan Bühring. Improved means to be employed in the purification of water and other liquids, and the preparation and treatment of materials therefor. May 25.

7627. Ivan Levinstein. Improvements in the production of azo-colouring matters. May 26.

7628. Henry Walker. Improvements in and connected with steam-boiler and other heating, melting, and smelting furnaces, muffles, and the like for various purposes. May 26.

7661. William George MacIvy. A new way of making soda. May 26.

7681. Herbert John Haddan. Improvements in apparatus for purifying oil. May 26.

7701. Carl Friedrich Claus, Henry Livingstone Sulman, and Edward Elhanan Berry. Improvements in the manufacture of soda by the ammonia-soda process.

7714. John Henry Richardson Dinsmore. Improvements in and connected with the manufacture of illuminating gas from coal. May 27.

7733. James Yate Johnson. Improvements in the manufacture of dyes. May 27.

7746. Thomas Darling and John Ford. Improvements in and relating to machinery or mechanism for breaking, crushing, and grinding phosphate-stones and similar hard materials used in the manufacture of manure. May 27.

7754. Emil Fleischer. Improvements in separating solid matter from smoke or gases resulting from combustion, and apparatus therefor. May 27.

7761. Ephraim Alcock Jones and Frederick Francis Jones. Improvements relating to the preparation of oxides of iron and to apparatus therefor. May 27.

7811. Wilhelm Bäcker. An improved process of treating tar for the purpose of producing illuminating and heating gas and coke. May 28.

7812. Adolph Liebmann and Arthur Studer. A process for producing a new mono-sulpho acid from alphanaphtol. May 28.

7833. James Yate Johnson. Improvements in the treatment and preparation of napthazarine (dioxynapthaquinone) and the production of a soluble derivative thereof, and the application of the same in dyeing and printing. May 28.

7859. Leonhard Adolf Staub. Improvements in the manufacture of carbonate of soda and carbonic acid from the bicarbonate, and in apparatus therefor. May 31.

7867. William Miligan Fraser and James Snodgrass. Improvements in primary distilling apparatus for shale or other oil-yielding mineral. May 31.

7896. Andrew M. Coyle, Eliphalet F. Andrews, and Edward C. Davidson. Improvements in distillation. [Complete specification.] May 31.

7906. Richard Schneider. Producing hydrate of baryta from sulphate of barium. May 31.

7931. William Phillips Thompson. Improvements in demijohn and carboy cases for acids and other liquids. June 1.

7990. John Imray. Improvements in incandescence gas-burners. June 2.

8090. Frederic Lennard. Improvements in apparatus used in the distillation of tar or oil. June 4.

8129. Leonhard Adolf Staub. Improvements in the manufacture of carbonates of soda. June 6.

8194. Charles Leopold Baillard. Improvements in the treatment or preparation of mineral and other like oils. June 7.

8213. Samuel Hallsworth and Richard Bailes. A new or improved method or process of manufacturing ferric sulphate or sesquipersulphate of iron, commonly called nitrate of iron. June 8.

8217. George Harrison Bolton, Josiah Rigby Wylde, and Henry Auer. Improvements in or relating to the manufacture of permanganate of soda, or of a mixture of the same with other disinfecting or oxidising matter. June 8.

8253. Frederick Crane. Improvements in pyroxyline compounds and varnishes, and in the treatment of certain alcohols for obtaining acetates, chiefly applicable as solvents for proxyline. June 8.

8265. Sydney Pitt. The manufacture of a new naphtol-disulphonic acid and of dyestuffs therefrom. June 8.

8289. William Bramley. Improvements in obtaining chlorine or hydro-chloric acid from chloride of calcium. June 9.

8296. Ludwig Paul. A process or processes for the production of colours from tetrazodiphenyldicarb[illegible] acid, and from its methyl and ethyl ethers. June [illegible]

OUR PRICE CURRENT.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
Acids:—			
,, Acetic, 25 % ... ... per cwt.	0	10	6
,, Arsenic... ... ... ,,	0	15	0
,, Chromic ... ... per lb.	0	0	8
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	6
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	3
,, Oxalic ... ... ,,	0	0	4
,, Sulphuric (fuming %) ... ... ,,			
,, ,, (Brimstone 168°) ... per ton	4	5	0
,, ,, (Pyrites 168°) ... ... ,,	3	10	0
,, ,, (spent oxide 168°) ... ,,	4	0	0
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	2	0	0
,, Tartaric ... ... per lb.	0	1	6¾
Alum... ... ... per ton	4	17	6
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
,, = 24° ... ... ,,	0	0	1⅞
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per cwt.	1	3	0
,, ,, (sal-ammoniac) ... ,,	36/- & 34/-		
,, Sulphate (grey), London ... per ton	12	10	0
,, ,, (grey), Hull ... ... ,,	12	10	0
Aniline Oil ... ... per lb.	0	0	10½
,, Salt ... ... ,,	0	0	9
Antimony... ... ... per ton	33	0	0
,, (tartar emetic) ... ... per lb.	0	0	11
Barium Chloride ... ... per ton	7	10	0
,, Carbonate (native) ... ... ,,	4	5	0
,, Sulphate (native levigated) ... ,,	3	10	0
Bleaching Powder, 35 % ... ... ,,	7	8	9
,, Liquor, 7 % ... ... ,,	2	10	0
Bisulphide of Carbon ... ... ,,	13	0	0
Coal-tar Dyes:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... ,,	0	5	0
Coal-tar Products:—			
Anthracene, 30 % f.o.b. Goole, per unit per cwt.	0	1	0
Benzol, 90 % ,, ... per gallon	0	3	8
,, 50 % ,, ... ,,	0	3	0
Carbolic Acid (crystallised 35°) ... per lb.	0	0	10½
,, (crude 60°) ... ... per gallon	0	2	8
Creosote (ordinary)... ... ... ,,	0	0	1
,, (filtered for Lucigen light) ,,	0	0	1½
Crude Naphtha, 30 % @ 120° C. ,,	0	1	1
Grease Oils, 22° Tw. ... ... per ton	1	7	0
Pitch, f.o.b. Liverpool or Garston ... ,,	0	11	6
Coke-oven Oils (crude) ... ... per gallon	0	0	1
,, (distilled) ... ... ,,	0	0	1½
Copper (Chili bars) ... ... per ton	39	10	0
,, Sulphate ... ... ,,	13	17	6
,, Oxide (copper scales) ... ... ,,	36	0	0
Glue ... ... per cwt.	1	17	6
Glycerine (crude) ... ... per ton	33	0	0
,, (refined) ... ... ,,	52	10	0
Iron (turnings)... ... ... ,,	1	13	0
,, Peroxide (blue billy) ... ... ,,	0	6	6
,, ,, (bog ochre) ... ... ,,	1	13	0
,, ,, (precipitated ... ... ,,	3	0	0
,, Sulphate (copperas) ... ... ,,	1	5	0
,, Sulphide (antimony slag) ... ... ,,	1	1	0
Lead (cash ... ... ,,	13	10	0
,, ite) ... ... ,,	24	15	0
,, ... ,,	22	0	0
Mi n and wire) ... ... per oz.	0	2	6
de ... . per ton	2	5	0
ate .. .. per cwt.	1	17	6
Magnesium, Hydrate ... ... per cwt.	0	10	0
,, Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... . ,,	19	0	0
,, Borate .. .. per cwt.	2	5	0
,, Ore, 70 % ... ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	4
Oils:—Castor ... ... per cwt.	1	5	0
Cocoa-nut ... ... per ton	26	0	0
Cotton-seed ... ... ,,	20	10	0
Colza ... ... per ton	24	15	0
Linseed ... ... ,,	21	10	0
Lubricating, Scotch, 885°—890° ... ,,	5	15	0
Oleine ... ... ,,	18	0	0
Palm ... ... ,,	20	0	0
Petroleum (refined for burning) Russian per gal	0	0	5 3/16
,, ,, American ,,	0	0	5 7/16
Rape ... ... per ton	24	0	0
Rosin ... ... ,,	10	10	0
Sperm ... ... per cwt.	2	15	0
Whale ... ... ,,	1	0	0
Silver (metal) ... ... per oz.	0	3	7⅝
,, Nitrate ... ... ,,	0	2	7½
Starches:—			
Sago ... ... per cwt.	0	9	0
Potato (farina) ... ... ,,	0	10	6
Rice ... ... ,,			
Sodium (metal) ... ... per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 % per ton	5	0	0
,, ,, (Caustic Soda-ash) 48 % ,,	4	0	0
,, ,, (Carb. Soda-ash) 48 % ,,	4	2	6
,, ,, (Soda Crystals) ... ... ,,	2	6	3
,, ,, (Crystal Carbonate) ... ,,	5	1	6
,, Chlorate ... ... per lb.	0	0	7½
,, Borate (Borax) ... ... per cwt.	1	7	6
,, Bichromate... ... ... per lb.	0	0	3¼
,, Hydrate (76 % Caustic Soda)... per ton	9	12	6
,, ,, (70 % Caustic Soda) .. ,,	8	0	0
,, ,, (60 % Caustic Soda, white),,	6	17	6
,, ,, (60 % Caustic Soda, cream),,	6	8	9
,, Bicarbonate ... ... ,,	6	5	0
,, Hyposulphite ... ... ,,	5	5	0
,, Nitrate (95 %) ex ship Liverpool per cwt.	0	9	3
,, Silicate (glass) ... ... per ton	5	10	0
,, ,, (liquid, 140° Tw.)... ... ,,	5	7	6
,, Sulphate (Salt-cake) .. .. ,,	1	4	6
,, ,, (Glauber's Salts) ... ,,	2	2	6
,, Sulphite ... ... ,,	5	17	6
Potassium (metal) ... ... per oz.	0	4	0
,, Bichromate ... ... per lb.	0	0	4½
,, Carbonate, 90% ... ... per cwt.	0	19	0
,, Chlorate ... ... per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ... per ton	23	10	0
,, Nitrate (refined) ... ... per cwt.	1	2	0
,, Prussiate Yellow ... ... per lb.	0	0	7½
,, Sulphate, 90 % ... ... per ton	11	15	0
,, Muriate, 80 % ... ... per ton	9	5	0
Strontium Hydrate, 40 % ... ... per cwt.	10	0	0
Sugar, Beet ... ... per cwt.	0	12	0
,, Cane ... ... ,,	0	14	9
Sulphur (Flowers) ... ... per ton	9	5	0
,, (Roll Brimstone) ... ... ,,	6	0	0
Superphosphate of Lime (28 %) ... ... ,,	1	16	0
Tallow ... ... ,,	22	0	0
Tin (metal) ... ... ,,	103	0	0
,, Crystals ... ... per lb.	0	0	6⅞
Zinc (Spelter) ... ... per ton	14	10	0
,, Chloride (solution 96° Tw.) ... ... ,,	5	15	0

SATURDAY, JUNE 25, 1887.

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

(Continued from page 28.)

THE patent of Christopher Binks and John MacQueen mentioned on page 28, for treating certain manganese compounds and obtaining oxides of manganese and other products therefrom, appears to be for a process in which atmospheric air or oxygen gas is brought into contact with a salt of manganese in solution, simultaneously with any decomposition of the salt that shall set free its oxide, for the purpose of superoxidising the oxide. The ninth clause relates to the solidification of artificial oxide of manganese so as to form hard cakes or lumps, it not having been recognised by the inventor that the artificial oxide might be run or pumped to the stills as a mud or magma, as is done now.

In June of the same year Hunter obtained letters patent for treating waste liquors in the manufacture of chlorine. There was nothing new or novel in this so-called invention, and only illustrates the lax way in which letters patent were granted in those days. The process consisted in neutralising the free acid in the stills by means of the artificial oxide of manganese as was done by Elliott and Pattinson, the waste still liquor being only equivalent to weak acid which these patentees used; the iron was then precipitated with carbonate of lime, and the manganese afterwards thrown down as hydrate, with hydrate of lime. This hydrate of manganese was calcined in air as described by Hugh Lee Pattinson, when the protoxide was partially dissolved out, leaving the peroxide for the production of chlorine.

A glance over the history of manganese recovery will show how many times various inventors went over the same lines, and it is very surprising to the chemical engineer of the present day that up to this time at least no very determined effort had been made to solve the problem, or to combine the best portions of the various processes which had been patented, to make one workable process.

In July 1860, Joseph Townsend and James Walker proposed to lixiviate soda waste with water, and to mix the solution with chloride of manganese liquor which had been previously freed from iron. The precipitate, consisting of sulphur and sulphide of manganese, was to be collected, drained on filters, cut into cubes, and dried at 212° F. This sulphide was then to be burned in ordinary pyrites kilns, whereby sulphurous acid was formed for use in the oil of vitriol manufacture, while the residue consisted of oxide of manganese.

In this same year R. Calvert Clapham called attention to the necessity of obtaining more hydrochloric acid from the salt employed in the manufacture of salt-cake, and of not turning so much into the river as weak acid. In the specification, the strength of the wash-tower water is spoken of as varying from 1° to 6° Twaddell, and the process for which the patent was granted was to use this acid in the place of water, down the strong or acid-making tower; a process not, however, very easy of execution in those days, as Bailey's acid-resisting metal was not then known. This process may have been adopted in several works on the Tyne, but to our personal knowledge it was not in use as a common operation in Lancashire even in 1871.

R. C. Clapham in 1863 proposed to heat the still waste in a furnace, and to drive off the free acid to be collected in the ordinary acid tower. It is stated that the hydrochloric acid obtained generally averaged 15° Tw. Mention is also made in this specification of the decomposition of the residue with lime, or any of the earth's alkalies.

We now find ourselves brought to the year 1866, in which William Francis Deane obtained provisional protection for a process in which waste chlorine liquor was used to extract the copper from *roasted iron pyrites*, and after precipitation *of the copper and iron*, the manganese still in solution was to be precipitated and again treated by any well-known process for the production of chlorine.

It may be well at this point to call attention to the *modus operandi* by means of which chlorine was manufactured at this time. Native manganese was acted upon at a temperature considerably elevated, by means of strong hydrochloric acid. The steam was turned on at very various times in the different works, and there was more often than not no test applied to the contents of the still to ascertain when it was finished, the running off into the nearest drain, sewer, or stream being left to the foreman or to the man in charge of the stills. In other works things were carried on more carefully, the percentage of free acid in the still liquor was sought for, and the stillman was not allowed to run off the stills until a certain percentage of the free acid had been neutralised into manganese. Then again, the practice of many works varied in the method of introducing the native manganese into the stills, and even the quality of the manganese was a variable figure. Some manufacturers worked with as strong a manganese ore as could be obtained, some preferred 70 °/₀,— others 60 °/₀,— while a few were eager always to buy up any cheap and low strength stuff they could lay their hands on. In one works well known to the writer the manganese used to be ground up with water to a thin magma, and after settling in a "back" was introduced into the still in that state. This method was, however, given up in 1871 on account of the dilution of the acid with the water so introduced. The general plan was, therefore, to break up the native manganese so that it would pass through a 1¼ inch riddle, and to charge a certain amount into each still. A deficiency of acid was now run in, and after a certain time, found by experience, steam was slowly and gradually admitted, and was continued until the still was judged by the attendant to be worked off. A second and third still, and even more, was often worked upon the residues, when after a sufficient quantity of "dirt" had accumulated in the still, it was given an extra dose of acid, the deposit well washed with a hose pipe and water, and the manganese unacted upon picked out from the gangue, and set aside so be worked over again.

These were the waste liquors which various experimenters up to this time had attempted to turn to account by bringing the manganese into that form again, so that it might be used to disengage chlorine, and also in some instances to regain the free acid which some still liquors contained in large quantities.

When hydrochloric acid of 30° Tw. was used for the stills, the resulting still waste usually stood at 35° Tw., and contained about 75 °/₀ of the acid in combination; the waste more often than not containing 35 grms. per litre of free acid, or, in other words, 35 ounces of H. Cl. per cubic foot. These liquors also contained about 90 grms. per litre of manganese (as Mn.), about 10 grms. of iron (as Fe.), and were so saturated with chlorine that a cubic foot usually contained from 1 to 2 ounces of this gas dissolved.

These were the liquors which found their way into the canal, river, or sewer, and which had puzzled nearly a generation of manufacturing chemists to deal with.

If we look back at the various patents which had been taken out up to this date (1866), we shall find that all the necessary knowledge was available. Every process which has been found necessary, and which is working amongst us to-day, had been not only invented but patented in some form or another by those who had worked at the subject.

The acid still liquors had been investigated and the free acid had been regained by Clapham, by others the acid had been neutralised by lime and by carbonate of lime also. The iron had been eliminated by carbonate of lime by many inventors, and the precipitation of the manganese by means of lime, and its subsequent oxidation with air, was spoken of by all after Gossage as a well-known operation. Hag[illegible] had also indicated in a parallel process that an exc[illegible] lime accelerated the oxidation process. How was it, [illegible] that the accomplishment of a scheme of such importance so long delayed?

(To be continued.)

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

V. CHEMICAL APPLIANCES AND APPARATUS.

In roaming about through the vast annexe containing the machinery in motion, we came across many exhibits of more than ordinary interest to the chemical engineer or constructor of chemical plant. To take, for instance, motors intended for use with other power than steam, we find gas engines represented at the stands of Messrs. Crossley Bros. Limited, Messrs. Tangye, and also Messrs. J. and H. Andrew of Stockport, and Messrs. Dempster of Elland. Messrs. Crossley Bros. Limited also show at Stand 484 an excellent collection of domestic motors and electric light fittings for private houses. Amongst the open air exhibits may be found specimens of gases of various kinds doing work in driving gas motors, and these should occupy the attention of all those interested in driving small machinery. At Stand 660 may be seen an oil gasworks in full operation, showing the gas being made by passing petroleum through red-hot tubes. The gas is stated to be sixty-candle, and in the exhibit is a practical demonstration of the light compared with that from Manchester gas.

The Dowson Economic Gas and Power Co. have also an apparatus in operation provided with a governing arrangement, by means of which the production of gas is regulated automatically, so as to suit a varying rate of consumption. The gas produced is used for driving a fourteen horse-power Otto engine.

Messrs. A. Shirlaw and Co. show at Stand 670 several sizes of Spiel's patent petroleum engine, one of which is driving a dynamo and an installation of thirty incandescent lamps; another is driving a Bailey Harlech strap pump, while larger sizes are worked by the attendant as required. After seeing the Hargreaves motor at Widnes, and the Spiel engine at this exhibition, we feel we are at the beginning of a great revolution, when coal will no longer be allowed to pollute the atmosphere and ruin the earth, its place being taken by a much more suitable agent. It may take a long time to bring about such a change, but come it will.

Lowcock's fuel economiser and Green's economiser find a place in this exhibition, while the pumps of Pearn, Cameron, Worthington, and others are good specimens of what can be done in this direction. Speaking of pumps it should be noticed that many small exhibits in the exhibition are worked by hydraulic motors, the waste water being discharged into a common sump. Over this sump Messrs. W. H. Bailey and Co. have placed one of their stationary "Cymric" steam fire-engines, to return the water to the lake, thus economising the consumption of water from the mains. We have already noticed Messrs. Bailey and Co.'s exhibit in the Chemical Section, but the visitors attention should be directed to Stand 575 in the section devoted to machinery in motion. There are many things here which are not to be found in the exhibit in the Chemical Section, though quite as interesting to chemical engineers. At Stand 667 in the grounds may be seen examples of both vertical and horizontal hot-air engines, which are a specialité of this well-known firm.

A very good exhibit of apparatus and appliances used in the manufacture of coal-gas may be found exhibited by Messrs. R. and J. Dempster, of Manchester. There is a complete model of a sulphate of ammonia making plant, which may perhaps be interesting to many of our readers, and the model of the well-known Dempster scrubbers has also been very well executed.

The anti-friction conveyer, and the dust collector already mentioned, may be seen at Stands 502 and 505, and will assuredly find many applications in chemical and allied works. Water meters, which of course may be also applied to many other liquids, may be found at Stand 595; weighing machines at 584 and 585; and at 588, Messrs. Newton, Chambers, and Co., of Thorncliffe, near Sheffield, have a very excellent show of articles made in their works, such as apparatus for cooking and heating. The "*Thorncliffe*," "*Yorkshire*," and "Leamington ranges are here exhibited, together with grill stoves and steam-cooking apparatus. These exhibits may possibly by some not be considered as coming strictly within the scope of the title of our articles, but we hold that it would be much more satisfactory to all of us if cooking was considered a chemical operation; and these appliances are certainly much more strictly chemical than an exhibition of acoustic pulpits, displayed in the section devoted to chemistry and allied industries.

The different forms of machines for the manufacture of aërated waters are shown in operation at the Stands of Messrs. Bratby and Hinchcliffe (511), Mr. T. W. Lawson (511A), and of Mr. Dan Rylands, of Barnsley (512). A very considerable amount of ingenuity has been displayed in the construction of apparatus in connection with this industry, and not the least interesting are the methods by means of which the time-honoured cork has been superseded.

Faulder's confectionery apparatus stands close by, and many an idea may be passing through the brain of the chemical engineer as he watches the curious effects produced with it; he may be pondering over the possible effect of the introduction of saccharine on such an industry as this. Confectionery making is a very interesting process, and the physical bearings of the process of whole fruit preserves shows the usefulness of science when combined with practice.

The manufacture of chocolate confectionery is illustrated at Stand 438, by Messrs. J. S. Fry and Sons of Bristol, and gives one an idea of one of the very many industries which have sprung up during the years of Her Majesty's reign.

There is but little in the whole exhibition of machinery in motion which has met our eye dealing with the sugar industry, perhaps it is thought to be a decaying one and worthy of no consideration. The Bristol sugar industry has been crushed, London is suffering, and Liverpool gasping for breath, what will be the outcome of it all we dare hardly inquire. The copper vacuum pan for concentrating liquids, such as sugar solutions, at low temperatures, exhibited by Messrs. Fawcett, Preston and Co., of Liverpool, at Stand 447 has drawn out these remarks,—if the sugar industry leaves our shores there will be but little need of vacuum boilers or men to work them.

The last objects we feel called upon to notice in connection with chemical plant and apparatus are the working-drawings of chemical plant exhibited by ourselves. They are drawings of actual plant in operation in different parts of the country, specially designed for definite objects, and are improvements upon many designs generally in use. There is plan, section, and cross sections of the Porion evaporator, further mentioned on another page, used exclusively in this country for recovering the waste soda liquor of the paper manufacturer; it is used largely on the Continent, and is working in about eight mills in Great Britain. There is also a working-drawing of the kiln used for burning the spent oxide of the gasworks in the vitriol manufacture. An ordinary kiln cannot be used for this purpose on account of the organic matter present, so provision has to be made for a more thorough combustion than could be obtained in ordinary pyrites kilns. Drawings are also shown of the Gay-Lussac tower for the recovery of nitre in the vitriol manufacture, and of the concentrating tower, of which Mr. Davis was the first to introduce the low form, and for spent oxide burning. This tower was generally considered unfit for dealing with spent oxide gases until Mr. Davis erected it at three different works in the country. A drawing is shown of a wet copper calciner, fitted with Mond's smokeless fire-place, the fire being directed under the bed instead of over the arch as usually adopted. In this case the heat is directed where it is required, and provision made for continuing the combustion along the whole length of the furnace. Working-drawings of muriatic acid towers, and burners for burning small pyrites, complete the set; and we are only surprised that the committee did not endeavour to arrange for more exhibits of this nature, which might easily have been obtained from many quarters, as no doubt there are drawings in existence which would have shown in a very complete manner the

remarkable progress made during the last fifty years in that branch, which is at last beginning to be known as *Chemical Engineering*.

(To be continued.)

BUTTER SUBSTITUTES.

THE evidence given before the Select Committee appointed by the House of Commons to inquire into the bills for regulating the sale of butter substitutes, turns out to be of rather an amusing character, and only shows how difficult it is to get rid of what has been denominated in chemical experiments "the personal equation." It seems to us that in our law-courts, before select committees, and other tribunals and courts of arbitration, too much weight is attached to the *opinions* of scientific and trade witnesses, as contrasted with the evidence they furnish based upon *facts* pure and simple; and we have noticed that questions are often put to chemical witnesses, bearing upon results obtained in the laboratory, and opinions elicited as to what would be the effect of such and such a reaction when applied on the large scale to manufacturing operations of which the witnesses in question have had no practical knowledge whatever.

This has partly arisen from the extensive nature of the information required in dealing with technical subjects, and it should be remembered by all those desiring to obtain evidence of a weighty and trustworthy kind, that it is almost an impossibility to secure the services of an expert capable of giving reliable information on all branches of chemical technology. Each expert has his *forte;* but it is not always safe to take his own opinion of himself as the correct estimation of his worth. A chemist who has had two or three years of work in the laboratory of a dairy may consider himself quite an authority on all matters agricultural, which may not perhaps be endorsed by those who know him more intimately; still, if asked in the witness-box, whether he had had great experience in agricultural chemistry we have no doubt at all what the answer would be.

Not only does the above argument apply to the chemical expert, but the *opinions* of trade witnesses must be received with even greater caution. If they would tender facts, and facts only, these could be easily sifted by men of experience, but mere *opinions* are so prejudiced by pecuniary considerations that we consider such evidence to have no judicial value whatever. It is not likely that a man who had invested his all in a butterine factory would for one moment imagine that article to be unsatisfactory in any way as an article of food. As a shrewd business man he would satisfy himself that it was satisfactory before he invested his money, and having once laid out his capital, he would naturally take every legitimate means in his power to protect it.

To judge from the evidence given to the Select Committee on this subject, butterine must have a very strong effect upon the palate, and we should infer the taste to be an acquired one, as in the case of olives, tomatoes, and many other articles of diet. Mr. G. Handasyde Dick, a butterine manufacturer, stated that the article made by his firm was actual and pure butter, as pure as that made wholly from milk, only that it had less butyric acid, which gave the butter smell and flavour. Butter was the refined fat of the animal recovered from the milk, butterine was the same fat recovered in a different manner. Mr. Dick is also reported to have said that on board his yacht and in his houses in town and country he always used butterine, which he preferred to any butter he could get.

We are prepared to admit, and no doubt others will agree with us, that there is no harm in allowing the sale of butterine as such, provided it is never substituted for butter itself. According to statistics there is evidently more butterine than butter used in this country; but it is certain that this ratio between the two articles is not preserved in the matter of labelling when exposed *for sale in retail* shops. The public analysts *throughout the country should have been more consulted on this question than they have been.* It would have been easy to have obtained a return from every public analyst in the country as to the percentage of butter samples found adulterated amongst those sent in for analysis, but even these returns would give much lower figures than the actual state of things, as we have found that butterine is often substituted for butter where least expected. This statement is borne out by Mr. Harris, of the firm of Messrs. Budgett and Co., butter merchants, of Bristol, who stated before the committee that in his opinion, 75 per cent. of the butterine was sold as butter. This is exactly what the supporters of the Butter Substitutes Bills wish to prevent as much as possible; it is not the fact that they desire to hinder the sale of butterine as one witness suggested; but that an article selling for fourpence per pound should not be foisted upon the public for one having four times that value.

One way to follow the article in all its mutations from butterine to butter, would be to place a small tax upon it, and the Government being fiscally interested would (if pure butter went free) see that none was mixed and sold as an untaxed article. Any one may readily see how this plan would work, and it is because it would act so seriously against those who would sell butterine as butter that the imposing of a tax has been so strongly opposed. It is all nonsense talking of the tax as anything tending to kill the industry, as any one may see by following the statistics of protected trades. It is notorious that the only industries at present prospering in the United Kingdom, are those for the supply of gas and water, the brewing, distilling, and tobacco industries, and the precedent of these three last may easily be followed by calling the impost a *duty* instead of a tax.

It is quite certain that a duty of one halfpenny per pound upon butterine, coupled with the proviso that any substance of that nature exposed for sale and not ticketed or labelled as to its true composition should be regarded as pure butter, would meet all the requirements of the case. If a sample of butter was taken by the Excise authorities and found to contain butterine which had paid no duty, then heavy penalties should result.

We differ with many authorities on the propriety of placing a duty on articles of food. In this case a manufacturer introduces a new article, by the sale of which he makes large profits, he has supplied the public with a substitute for butter at a cost of fourpence per pound, or a saving to the consumer of at least sixpence. After a time this cheap article is used to adulterate good butter, and the loss to the consumer thereby is many times greater than a Government duty would ever be. We say that the State has every right to step in and say "We will protect you from this fraud, but we shall require one halfpenny per pound for our services." And to the consumers of pure butterine, it might with propriety say "It is only right we should enjoy some small proportion of the advantages accruing to you by the use of butterine, if it has saved you many pence per pound in outlay the only portion we ask you for is one halfpenny." The public must not be too exacting—public benefits must be divided between the individual and the State; the State requires a well-filled treasury in order to carry on a responsible government, and to us it does not seem to matter much whether the revenue is obtained from tea or butterine.

Some years ago we were amongst a party visiting a stearine works near London, a well-built factory for the manufacture of stearine for candle-making. Here, beef-suet was brought into the siding in railway trucks, similar to those in which foundry coke is usually dispatched. After being unloaded into wicker-work trolleys or tram wagons, it was taken to a machine and masticated, whereby the fat-cells were completely broken up. The masticated fat was then conveyed to a series of steam melting-pans, where it was melted up and allowed some time to settle. The clear melted fat was then run into tins or moulds, and placed for some time in a room or chamber carefully heated to a certain temperature. After a time the stearine crystallises out, and the magma is passed through a filter press, and the stearine is left behind as a solid white cake, which is used in the manufacture of candles. The oil which runs through the press is termed

oleo-margarine, and we were informed was sent away for the manufacture of butterine.

Now, in the manufacture aforesaid there is little as described to find fault with, but it should be remembered that the suet used is not in all cases of the finest description. Under the influences of a July sun suet is very liable to turn rancid, and very liable indeed when in bulk to be attacked by swarms of blow-flies; of course such suet could not be used in domestic cookery, but it does not seem to be affected or deteriorated in any way for the manufacture of candles and butterine. In the factory we visited, the floor leading from the suet wagons to the masticator was thickly strewn with maggots, which an ardent fisherman might envy; many went into the masticator with the suet, but their skins would sink down to the bottom of the melting-vat, and although the smell of the suet was not most pleasant, and the melting room reminded one more of a tallow chandlery than a dairy, yet there was no decided odour or taste in the oleo-margarine produced, and we have not a doubt but that the butterine produced from it was of excellent quality so far as butterine was concerned.

THE PORION EVAPORATOR.

The Porion evaporator was invented for and applied to the evaporation of the "lessive," or liquor left in the still, from which alcohol has been prepared from the beetroot molasses. Beetroot molasses are too much contaminated with foreign matters (caramel, salts, asparagic acid, &c.) to be employed for sweetening as cane molasses are. They contain an average about:—

Sugar	48·0
Salts and organic matters	34·0
Water	18·0
	100·0

These molasses are therefore reduced with water to 1·075 specific gravity (15° Tw. or 10° B.), and mixed with about 1 per cent. of mineral acid and fermented. After the fermentation and distillation, the "vinasse" remaining in the still is only 1·035 specific gravity (7° Tw. or 4·5° B.); it is neutralised with chalk, evaporated to dryness and calcined. The crude mass when drawn from the furnaces contains the following substances:—

Carbon and insoluble matters	23·00
Potassium sulphate	10·07
,, chloride	11·61
,, carbonate	31·40
Sodium ,,	23·26
	99·34

This is the crude carbon of molasses, from which the ordinary salts of potash are prepared.

Liquor of a specific gravity 1·035 is not much stronger than sea water, so it will be seen what a necessity an efficient evaporator is in this process, and the extent of the manufacture may be judged from the fact that, in 1885, more than 12,000 tons of potash salts were made from this refuse matter alone.

When this evaporator was found to be of such value to the alcohol distiller foreign paper makers soon took it up. They had a liquid containing soda to deal with, very valuable in itself, but so much diluted with water as not to pay for boiling down by any ordinary way; its specific gravity varies from 1·035 to 1·055, and the recovery of the soda from it is easy and inexpensive, yet many manufacturers in this country let this valuable solution run away to waste.

The first Porion evaporator erected in Great Britain was at the works of the Inveresk Paper Company, at Musselburgh, near Edinburgh. Their former evaporator was an old-fashioned surface heat evaporator, the fuel used was from six to seven tons of good coal to every ton of soda recovered; but this was abandoned on account of threatened legal proceedings against the smell proceeding from it.

Mr. R. C. Menzies, the managing partner at Inveresk, in the summer of 1875 saw Mr. Porion's evaporator at his own place in France working so successfully that he determined to adopt it at Musselburgh.

The first evaporator was erected entirely from the French plans, which, after being in use some months, was found not to be suitable to the Scotch coal or the Scotch workmen. The whole plant had to be made stronger, and the furnace beds larger, and the fire-places altered to suit the Scotch coal. So much for the first machine. It is now evaporating 18,000 gallons of water per 24 hours, or 90 tons of waste esparto liquor daily.

The nature of this esparto or waste liquor from the paper mills depends upon whether it proceeds from esparto only, straw, rags, or wood.

Esparto liquor of 1·055 specific gravity (11° Tw.) contains:

GRAMMES PER LITRE, OR OUNCES PER CUBIC FOOT

	1	2	3
Soda Ash, 50 %	20·2	16·4	19·0
Resinous matters, acids, &c.	25·0	19·0	32·0

Roughly it may be taken that the resinous and organic matters (pectic, metapectic, and parapectic acids) are from once to twice the weight of the soda ash, varying with the excess alkali and the kind of grass used. 100 parts of esparto liquor will contain as follows:—

Water	90·386
Organic matters	6·258
Soda Ash	3·356
	100·000

The success of the machine at the Inveresk Mills induced the Messrs. Cowan to erect a second at their other mill at Penicuik to evaporate rag liquors 2° Tw. It worked successfully for some time, evaporating 14,000 gallons or 70 tons of water daily, and burning 24 tons of fuel weekly.

A third evaporator was erected at Strathendry, in Fifeshire, and is evaporating 7,000 gallons or 35 tons of water daily, burning 15 tons of very bad dross per week. The smell-and-smoke consumer acts perfectly; nothing escapes from the chimney but pure white steam.

The furnaces, furnace beds, and smell consumer, in fact the whole apparatus as far forward as the damper, must be lined with the best firebrick. The Garnkirk fireware seems to stand the volatilised soda better than any other brick. Some Portobello firebricks were used in the first evaporator; they fluxed very readily under the influence of the volatilised soda dust, which they absorbed.

The evaporator is built of ordinary bricks, set in hydraulic lime, and the fanners are driven by an engine of about four horse-power. The chimney is built of ordinary bricks, and the top two feet should be set in cement.

A remark is often made in books—that if the escaping gases could be reduced below the boiling point of water nearly the theoretical evaporation would be obtained, *but then the gases would be so cooled that there would be no draught for the fires.* Now, the Porion evaporator does reduce the temperature of the gases and vapours to below the boiling point of water, yet there is a very much stronger draught for the fires than is required.

The furnace fires require a very keen draught, yet a temperature of 170° F. in a chimney 50ft. high, on the plan for evaporating 10,000 gallons per diem, is more than sufficient, for 14,000 gallons are being evaporated and 26 tons of fuel per week being burnt in the grates.

The method of working the apparatus is as follows:—

The waste liquor to be evaporated is pumped into the iron pan placed over the smell consumer; here it is raised to the boiling point by the waste heat escaping from the furnaces. The hot liquor is then run into the evaporator, at the end nearest the chimney; the liquor then travels forward to the front end of the evaporating chamber, from whence it runs in a constant stream into the iron pan placed over the furnaces.

The operation is continuous; the pump is always throwing into the iron pan, and concentrated liquor is always

running out of the evaporator into the iron pans over the furnaces.

The depth of liquor is kept at a constant level of about nine inches, and the fanner blades dip half an inch below the surface. These fanner blades make about 300 revolutions per minute, and so produce a very fine spray; through which spray or rain the hot gases leaving the smell consumer pass on their way to the chimney.

The action of this spray upon the heated gases is immediate. The gases are cooled below the boiling point of water, and the spray completely washes out every trace of soot and sulphurous acid from the coal fire gases, nothing but volumes of pure white vapour escaping by the chimney.

If the fanner blades are not driven fast enough much heat escapes by the chimney, and, by stopping the fanners altogether, the heat rises in the chimney from below 180° F. to 400° F. *immediately*.

The specific gravities and temperatures of all the liquors in process in the Porion evaporator are usually as follow:—

Lye leaving pan over smell consumer, 5¾° Tw., at 214° F.

Entering evaporator near chimney, 6° Tw., at 210° F.

Running out of evaporator, 46° Tw., at 171° F.

Temperature of escaping gases in chimney, 172° F.

The Porion evaporator may be used in many industries, and we have calculated that the waste heat at present sent up the chimney of an alkali works would be sufficient to evaporate sea-water to the strength of saturated brine.

Correspondence.

CONDY'S FLUID.

To the Editor of the Chemical Trade Journal.

SIR,—I do not wish to re-try the case in your columns, but in reading the report of the trial of "Condy and Mitchell v. Taylor and Co.," I have been much struck with one fact. That is the very incomplete and inconclusive nature of the chemical evidence on both sides. None of the chemists concerned on either side appear to have taken the trouble to make such an examination as would have completely decided the question at issue. Some of them appear to have contented themselves with a colorimetric estimation of the remaining permanganate, while others determined the same constituent by a volumetric method. But no one appears to have tried to ascertain how much permanganate had been originally present, though a knowledge of this would have conclusively proved whether the liquid had been largely watered as was suggested.

A solution of potassium permanganate which has been reduced by organic matter becomes alkaline. It does not follow that the amount of alkaline hydrate or carbonate formed is an accurate measure of the permanganate reduced, much oxalate being formed by the oxidation of cellulose, for instance. The liquid should be treated with peroxide of hydrogen filtered from the precipitated MnO_2, the filtrate evaporated to dryness, the residue ignited, and in it the alkali determined by standard alkali and methyl-orange. The amount found would be the potash corresponding to the permanganate originally existing in the undeteriorated Condy's Fluid. A comparison of this with the amount found in a specimen of undoubted authenticity would have definitely settled the question whether the article had been copiously diluted or not.

A determination of chlorine might also have been resorted to, though less satisfactorily. The determination should have been made in a portion of the fluid which had been previously reduced by oxalic acid. Other methods of solving the problem will suggest themselves to most chemists, but it is curious that they do not seem to have occurred to those actively interested in the case.—I am,

ALFRED H. ALLEN.

Sheffield, June 18th, 1887.

Notes and Queries.

SUGAR DESTROYED BY FIRE.—Forty-five thousand bags of sugar of various grades (says a New York telegram) have been burned in a fire at Havemeyer Sugar Refinery. The destruction of these immense works has caused a loss estimated by some at a million and a half dollars.

THE WORK OF THE TRADE MARKS COMMITTEE.—The committee, presided over by Lord Herschell, appointed to inquire into the working of the provisions of the trade-marks and designs portions of the Patents, &c., Act of 1883, held a further meeting on Saturday week, when Mr. T. Windsor and Mr. J. Smithson, of Manchester, gave evidence on the question of the registration of headings for cotton goods.

SERIOUS ASPECT OF THE BOLTON STRIKE.—The strike in the Bolton engineering and machine making trade is assuming a serious phase, which is likely to result in similar action by the employers to that of the great iron strike of 1851. The executive of the Ironmasters Association in London have decided to grant the Bolton employers £25,000, and when that is expended, and if the men are still out, notices for a general lock-out throughout the Kingdom will be issued. This announcement is causing much concern in the town.

BUTTER SUBSTITUTES BILL.—The committee on this bill called on Mr. Cappen, of Cappen Brothers, Lambeth, to give evidence in reference to the sale of butterine. The public, he said, were not misled under the present conditions of sale, but he would approve of butterine being imported in distinctive packages. Mr. Barclay, wholesale butterine merchant, Manchester, strongly objected to any interference whatever by legislation with butterine, which was an invaluable article of food to the working classes, and he showed that, without the aid of butterine, the supply of native butter during the past winter would not have been sufficient for the population of Lancashire and Cheshire.

EXPLOSION AT MESSRS. ROBERTS, DALE, AND CO.'S WORKS IN MANCHESTER.—About noon on Wednesday, the 22nd instant, the whole neighbourhood of Cornbrook, and indeed the whole of the district for miles around, was alarmed by several explosions immediately following each other, and proceeding apparently from the immediate vicinity of Pomona Palace. Upon inquiry we found a most disastrous explosion had taken place at the chemical works of Messrs. Roberts, Dale, and Co., by which most of the buildings were razed to the ground. No one seemed willing to tender any information likely to throw any light upon the probable cause of the explosion, but it is known that this firm manufactured large quantities of nitrate of lead, and also of picric acid, which latter substance is used largely in the manufacture of the new explosive melinite, so, therefore, it is exceedingly probable that the cause of the mishap may be found here. The explosion did an immense amount of damage to the neighbouring mills and dwelling-houses, and it it a most miraculous thing to record that only two lives were lost, though many were injured, chiefly by the broken glass.

MR. RUSKIN'S OPINION OF NOXIOUS MANUFACTURES.

To the Editor of the Chemical Trade Journal.

Sir,—The following letter, which I have received from Mr. Ruskin, may interest some of your readers who, like Mr. Ruskin, long for pure air and clear skies.—I am, &c.,

J. CARTER BELL, County Analyst.

(Copy.) "Brantwood.

"My dear sir,—I am sincerely grateful for your paper, and for your reference to my own statements of feeling in such matters. I am more and more confident as I grow older if we could banish all noxious manufactures to an Arctic island there might be some hope, but I doubt the possibility of purifying the air of England as she now lives. I see your paper is No. 1, and you speak of it as one of your lectures on the impurity of the air. Are you going to continue? I cannot conceive more useful teaching. But I suppose the No. 1 refers to the series published by the N.V.A. Association.—Ever your faithful servant,

"J. RUSKIN."

[illegible] vaseline, 2 roubles [illegible] The gold [illegible]

[illegible] passed by the [illegible] provisionally [illegible] sugar at the rate of [illegible]

[illegible] rate of baryta, [illegible] per quintal. [illegible] = 9[illegible]

[illegible] reference to the [illegible] to control the [illegible] now reported [illegible] Bleichroder and [illegible] ready to form a [illegible] undertake the sale [illegible] the payment of [illegible] of the surplus [illegible]

[illegible] of machinery [illegible] textile fibres is to [illegible] of the Chilian [illegible] the auspices of the [illegible] National de Chile. [illegible] the best machine or [illegible] quality of the article [illegible] the simplicity of the [illegible] price. Motive [illegible] gratuitously, but [illegible] customs duties on [illegible] however, be returned [illegible] months.

[illegible]—Prepare a short [illegible] Na_2HPO_4) and [illegible] per cent. carbonate of [illegible] for one hour, [illegible] an airy room, heat [illegible] however, on cooling. [illegible] for subsequent lots [illegible] of chemicals and [illegible]

[illegible] alizarine brown is [illegible] the Badische Anilin und [illegible] a dark brown paste, [illegible] It dyes cotton [illegible] cotton mordanted [illegible] while wool mordanted [illegible] The steam colours [illegible] are of value. The [illegible]—*Anthracene Steam* [illegible] 200 parts gum traga- [illegible] brown paste; 50 [illegible] thoroughly, then add 90 parts [illegible] acetate of lime, 16° B. [illegible] An excellent deep brown [illegible] yellower by the addition [illegible] An alumina mordant [illegible] they are less fast than [illegible]

[illegible] PENDLETON.—Mr. F. Price held [illegible] the 20th instant touching the death [illegible] aged 34. The deceased, who was [illegible] as a labourer at the Pendleton [illegible] the night shift, and about ten [illegible] the 12th instant, he was scraping [illegible] pan which was partly filled with [illegible] The pan was surrounded by iron railings, [illegible] being made to lift up. It is supposed [illegible] against this bar, which acciden- [illegible] and the deceased fell into the boiling [illegible] He was rescued by a fellow-workman, but was [illegible] about the legs and lower part of the body. [illegible] conveyed in a cab to the Salford Royal [illegible] where he succumbed to his injuries on Friday [illegible] A verdict of accidental death was returned.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday Morning.

The tropical heat of the closing three days of last week interfered with the local manufacture at various points, particularly in the making of soda crystals, in which, in consequence, a sharp though not well maintained advance took place. Since Saturday, temperature has been considerably lower, permitting the several affected makes to resume normal conditions. There has been nothing like activity in recorded general transactions in chemicals, but the feeling is at least no worse than at this time last week. Bleaching powder the makers are inclined to maintain, even at the cost of some restriction if necessary, and as high as £8. 5s., on ship, Clyde, has been done. Sulphate of ammonia, also, holds to the firming side on a reported scarcity, and £12. 7s. 6d. f.o.b. Leith has been touched, with a fair willingness to fix pretty freely for forward. Soda-ash dull at old prices, and caustics also weak in demand, but with prices nominally maintained. Bicarbonate of soda is in somewhat better inquiry at £5. 10s. in 5 cwt. casks net Tyne, and £5. 15s. in 1 cwt. casks same delivery. Soda crystals marked an advance of a shilling or two owing to the recent wave of heat, but with temperature at the greatly moderated pitch experienced since Saturday, the quotation must resume ordinary conditions. Borax is, perhaps, stiffer of tone at £31 for English refined, net Glasgow, and boracic acid is unchanged in feature. Bichromate of potash has experienced a slight falling off in demand as compared with the foregoing week, but bichromate of soda, on the other hand, has been in request at a considerably increased rate, with prices of both as recently readjusted. Refined alkali without fresh feature, and salt-cake better, if anything, at a fractional advance. Various additional meetings of makers of paraffin scale and wax have taken place since last report, but nothing definite has as yet been arranged, and prices continue at about last week's figures. At the annual convocation of the Gas Institute, appointed for Glasgow, 28th inst., some questions highly interesting to the chemicals manufacture will be discussed.

THE TAR PRODUCTS MARKET.

Benzols are a little easier, and 90's are to-day only worth 3s. 6d. per gallon; 50's, 2s. 8d. It is reported that sales have been made at 3s. 4d. and 2s. 6d. respectively, but the circumstances connected with such transactions are doubtful. Anthracene is in good request, and tar is still fetching good prices. Salford tar has just been let for 15s. per ton at the works.

THE SULPHATE OF AMMONIA MARKET.

The markets all over the country are very firm, and have remained so in spite of the Jubilee celebrations. Beckton price is now £12. 12s. 6d., but outside makes have fetched £12. 15s. £12. 12. 6d. is the price at Hull, and Leith market is quoted at £12. 7s. 6d., and very firm. The works on the Continent have sold well, and obtained very good prices for forward delivery.

THE PATENT LIST.

8333. Jokichi Takmine. For improvements in the method of and apparatus for bleaching paper pulp and analogous substances by electrolysis. June 10.

8337. Thomas Fletcher. For improvements in and relating to regenerative gas burners. June 10.

8357. Harold Rimmer. Improvements in and connected with the manufacture of material for purifying water, saccharine, and alcoholic and other fluids. June 10.

8384. Peter McAra, James Walker, James Aitken Birrell, Wm. Brock, Jun., and John Adam. Improvements in and connected with the preparing of, maturing, and treating of cut or reduced logwood and other dyewoods for dyeing and other purposes. June 10.

8414. John Arthur Yeadon and Robert Middleton. Improvements in machinery for drying small coal or coke, or for desiccating substances of a like granular character. June 11.

8426. Jacob Baynes Thompson and Wm. White. Improvements in the manufacture of sodium and potassium, and apparatus for the purpose. June 11.

8427. Jacob Baynes Thompson and Wm. White. Improvements in the manufacture of aluminium and its alloys, and apparatus for the purpose. June 11.

8431. John Imray. A process for the manufacture of anthraquinone. (Complete specification.) June 11.

8437. Ludwig Paul. Process or processes of producing mono and diamidoazobenzidines, transformation of them into tetrazo compounds and their combination with amines and phenoles (naphtoles), or the sulfo-acids of these bodies. June 11.

8528. David McGregor and John McArthur, Jun. Improvements in absorbing moisture from and deodorising fœcal and other refuse matter, and utilising the whole as a manure. June 14.

8559. Edward Walsh, Jun. An improved method of and apparatus for reducing zinc ores and collecting the metallic zinc therefrom. (Complete specification.) June 15.

8622. Ludwig Mond. Improvements in obtaining ammonia, chlorine, and hydrochloric acid from ammonium chloride. June 15.

8666. Alexander Macomb Chance and James Fredk. Chance. Improvements in treating alkali waste to obtain sulphuretted hydrogen, and in apparatus employed therein. June 16.

8705. Henry Lawrence. Improvements in machinery or apparatus for screening coal, mineral ores, and other substances. (Complete specification.) June 16.

8734. Richard Hunt. Improvements in the treatment of cottonseed oil, to refine and clarify the same, and to obtain colouring matter. June 17.

8752. Edward Edwards. Improvements and simplifying the tinting, staining, and colouring of manufactured glass. June 17.

8800. Fred. Will. Lacy. Improvements in apparatus connected with the treatment of sewage. June 18.

8815. John Henry Simpson, Granville de Montmorency MacKirdy, and Andrew Taylor. For an article of manufacture from the bark of a certain tree, being a textile material applicable for use in textile manufactures, including lint and wood wool, and process employed in obtaining such article. June 18.

8816. J. H. Simpson, G. MacKirdy, and A. Taylor. A manufacture of tannins, gallates, kinos, and other vegetable extracts from a certain tree, bark, and wood, and treatment and processes employed for obtaining such articles. June 18.

8820. C. T. J. Vautin. Improvements in the production of liquid or compressed chlorine. June 18.

8825. Robert Oxland. Improvements in the refining of oils and fats. June 18.

8854. Jacques Grunhut. Improvements in or connected with dyeing cotton, jute, hemp, linen, or the like, an ungreenable aniline black. June 20.

8860. Otto Wilhelm Gauhe. Improved detachable elevator chain. June 20.

8861. George Henry Mallary. Improvements in the manner, method, or mode of treating esparto grass and other fibrous materials for paper making and other uses. June 20.

8866. William Cross. Improvements in the manufacture of aluminium and aluminium alloys. June 20.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
ACIDS:—			
,, Acetic, 25 °/₀ ... ... per cwt.	0	10	6
,, Arsenic... ... ... ,,	0	15	0
,, Chromic ... ... per lb.	0	0	8
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	6
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	3
,, Oxalic ... ... ,,	0	0	4
,, Sulphuric (fuming °/₀) ... ... ,,			
,, ,, (Brimstone 168°) ... per ton	4	5	0
,, ,, (Pyrites 168°) ... ... ,,	3	10	0
,, ,, (spent oxide 168°) ... ,,	4	0	0
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	2	0	0
,, Tartaric ... ... per lb.	0	1	6¾
Alum... ... ... per ton	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
,, = 24° ... ... ,,	0	0	1½
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per cwt.	1	2	6
,, ,, (sal-ammoniac) ... ,,	36/- & 34/-		
,, Sulphate (grey), London ... per ton	12	15	0
,, ,, (grey), Hull ... ... ,,	12	12	6
Aniline Oil ... ... per lb.	0	0	10½
,, Salt ... ... ,,	0	0	9
Antimony... ... ... per ton	32	10	0
,, (tartar emetic) ... ... per lb.	0	0	11
Barium Chloride ... ... per ton	7	10	0
,, Carbonate (native) ... ... ,,	4	0	0
,, Sulphate (native levigated) ... ,,	3	10	0
Bleaching Powder, 35 °/₀ ... ... ,,	7	7	6
,, Liquor, 7 °/₀ ... ... ,,	2	10	0
Bisulphide of Carbon ... ... ,,	13	0	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... ,,	0	5	0
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. Goole, per unit per cwt.	0	1	0
Benzol, 90 °/₀ ,, ... per gallon	0	3	6
,, 50 °/₀ ,, ... ,,	0	2	8
Carbolic Acid (crystallised 35°) ... per lb.	0	0	10¾
,, (crude 60°) ... ... per gallon	0	2	9
Creosote (ordinary)... ... ... ,,	0	0	1
,, (filtered for Lucigen light) ,,	0	0	1½
Crude Naphtha, 30 °/₀ @ 120° C. ,,	0	1	2
Grease Oils, 22° Tw. ... ... per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ... ,,	0	13	6
Coke-oven Oils (crude) ... ... per gallon	0	0	1
,, (distilled) ... ... ,,	0	0	1½
Copper (Chili bars) ... ... per ton	39	17	6
,, Sulphate ... ... ,,	14	0	0
,, Oxide (copper scales) ... ... ,,	36	0	0
Glue ... ... per cwt.	1	17	6
Glycerine (crude) ... ... per ton	33	0	0
,, (refined) ... ... ,,	52	10	0
Iron (turnings)... ... ... ,,	1	13	0
,, Peroxi[illegible] billy) ... ... ,,	0	7	0
,, [illegible] hre) ... ... ,,	1	13	0
,, [illegible] ated ... ... ,,	3	0	0
,, [illegible] ... ... ,,	1	5	0
[illegible] lag) ... ... ,,	1	1	0
[illegible] ... . ,,	13	15	0
[illegible] ... ... ,,	24	15	0
[illegible] ... ... ,,	22	0	0
[illegible] ... per oz.	0	2	6
[illegible] ... per ton	2	5	0
[illegible] ... per cwt.	1	17	6

	£	s.	d.
Magnesium, Hydrate ... ... per cwt.	0	10	0
,, Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... . ,,	19	0	0
,, Borate .. .. per cwt.	2	5	0
,, Ore, 70 °/₀ ... ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	4
OILS:—Castor ... ... per cwt.	1	5	0
Cocoa-nut ... ... per ton	26	0	0
Cotton-seed ... ... ,,	20	10	0
Colza ... ... per ton	24	15	0
Linseed ... ... ,,	22	5	0
Lubricating, Scotch, 885°—890° ... ,,	5	15	0
Oleine ... ... ,,	18	0	0
Palm ... ... ,,	20	0	0
Petroleum (refined for burning) Russian per gal	0	0	5½
,, ,, American ,,	0	0	5½
Rape ... ... per ton	24	5	0
Rosin ... ... ,,	10	10	0
Sperm ... ... per cwt.	2	15	0
Whale ... ... ,,	1	0	0
Silver (metal) ... ... per oz.	0	3	7½
,, Nitrate ... ... ,,	0	2	7½
STARCHES:—			
Sago ... ... per cwt.	0	9	0
Potato (farina) ... ... ,,	0	10	6
Rice ... ... ,,			
Sodium (metal) ... ... per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀ per ton	5	5	0
,, ,, (Caustic Soda-ash) 48 °/₀ ,,	4	0	0
,, ,, (Carb. Soda-ash) 48 °/₀ ,,	4	0	0
,, ,, (Soda Crystals) ... ... ,,	2	8	9
,, ,, (Crystal Carbonate) ... ,,	5	3	9
,, Chlorate ... ... per lb.	0	0	7½
,, Borate (Borax) ... ... per cwt.	1	7	6
,, Bichromate... ... ... per lb.	0	0	3½
,, Hydrate (74 °/₀ Caustic Soda)... per ton	8	10	0
,, ,, (70 °/₀ Caustic Soda)... ,,	7	17	6
,, ,, (60 °/₀ Caustic Soda, white) ,,	6	16	3
,, ,, (60 °/₀ Caustic Soda, cream) ,,	6	7	6
,, Bicarbonate ... ... ,,	6	5	0
,, Hyposulphite ... ... ,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool per cwt.	0	9	0
,, Silicate (glass) ... ... per ton	5	10	0
,, ,, (liquid, 140° Tw.)... ... ,,	5	7	6
,, Sulphate (Salt-cake) .. .. ,,	1	4	6
,, ,, (Glauber's Salts) ... ,,	2	2	6
,, Sulphite ... ... ,,	5	17	6
Potassium (metal) ... ... per oz.	0	4	0
,, Bichromate ... ... per lb.	0	0	4½
,, Carbonate, 90% ... ... per cwt.	0	19	0
,, Chlorate ... ... per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ... per ton	23	10	0
,, Nitrate (refined) ... ... per cwt.	1	2	0
,, Prussiate Yellow ... ... per lb.	0	0	7½
,, Sulphate, 90 °/₀ ... ... per ton	11	15	0
,, Muriate, 80 °/₀ ... ... per ton	9	5	0
Strontium Hydrate, 40 °/₀ ... ... per cwt.	10	0	0
Sugar, Beet ... ... per cwt.	0	13	0
,, Cane ... ... ,,	0	15	0
Sulphur (Flowers) ... ... per ton	9	5	0
,, (Roll Brimstone) ... ... ,,	6	0	0
Superphosphate of Lime (28 °/₀) ... ... ,,	1	16	0
Tallow ... ... ,,	22	0	0
Tin (metal) ... ... ,,	103	5	0
,, Crystals ... ... per lb.	0	0	6½
Zinc (Spelter) ... ... per ton	14	10	0
,, Chloride (solution 96° Tw.) ... ... ,,	5	15	0

SATURDAY, JULY 2, 1887.

TO THE TRADE.

weeks ago, before our first number was actually d, we were much in doubt whether influential support be accorded us. A Journal run on similar lines to we have started has, we believe, not been attempted and therefore a certain amount of risk was run in y producing something which the trade did not . This, however, does not seem to be the case, as y instances we have received letters describing HEMICAL TRADE JOURNAL as a most useful pub- , and making suggestions for its further improvement. hall always be ready to consider any suggestion for rovement of the Journal which may be laid before us, may say that it was due to the representations of of our correspondents that the page devoted to al stocks and shares was discontinued. We felt that f the objections raised were perfectly valid, and we d to fill up the page with more readable matter.

ther this had anything to do with the increased ion we cannot say, but our subscription list has d more rapidly since the list of chemical and allied ents has been omitted, and we can now say with con- that it contains the names of most of the leaders e branches of chemical industry, at home and abroad, hich we are endeavouring to identify ourselves.

CHEMICAL TRADE JOURNAL is now finding an ng area of distribution. We are sending to sub- in the States, to Mexico, and to South America; to , Germany, Switzerland, Spain, Italy, and Russia; ia, Japan, and South Australia, and the home tion is also steadily increasing day by day.

would be exceedingly obliged if our readers would such small items of local news which may come heir notice, local newspapers, containing reports of f chemical cases; notes, queries, and even original of interest to the trade generally, bearing on the rcial side of chemistry as applied to the arts and ctures.

EXPLOSION AT MESSRS. ROBERTS, DALE, AND CO.'S WORKS IN MANCHESTER.

ur last issue we noticed in brief the very disastrous n which took place at the chemical works of Messrs. , Dale, and Co., at Cornbrook, in Manchester. On the 24th inst., an inquest was held by the deputy- , upon the body of James Martin who was killed by osion, and the site of the works was also visited by Majendie the chief Government Inspector of explo- gether with Superintendent Tozer of the Manchester gade.

disaster was supposed to have originated in a fire roke out in a stove used for drying picric acid. The d to check it, but finding their inability to do so, at shed out of the building. One workman, named Martin, seems to have remained, and to have played fire with a hose. The workpeople who went out those engaged in the premises opposite, and the iving or passing near; and a wide berth was given to e. Then in two or three minutes came a series of ns, rapidly following each other, and a final burst, ing nothing so much as a *mighty and prolonged* cannonade, and the whole building went bodily upwards. So great was the force of the explosion that burning spars were picked up nearly a quarter of a mile away. The body of Martin was found among the ruins some hours afterwards. The area within which damage was done and the extent of the damage are remarkable. Of the building itself, not even the shell remained; but half a dozen tall chimneys still stand. The store-house opposite is partially blown down, and every single window was shattered. The place was also set on fire. The force of the explosion is attested by the presence of two large holes, or craters, on the site where it occurred—one 33ft. in diameter and 8ft. deep, the other 25ft. in diameter and 8ft. deep.

At the inquest, the following evidence was tendered :—

Peter Heald, junr., said he was a mechanic in the employment of Messrs. Roberts, Dale, and Company, and was at the works on Wednesday morning. He was on the office side of the road in the mechanics' shop, when he heard that a fire had broken out. He was a fireman, and he went at once to get his belt. He attached a hose to the water plug, and the deceased went and held the jet in the road just under the window where the picric stove was. The fire appeared to be near the large hole made by the explosion, and between it and the lower hole in the centre of the sheds. All that part of the yard was covered with sheds. The deceased spoke to witness about getting a ladder, and the witness turned away, and immediately he heard an explosion, and then saw the deceased apparantly in the act of following him. Witness was running away and watching the things flying about him when the second explosion took place. Witness had then got about 20 yards away, and when he turned round the whole works appeared to have been blown up, and he could see nothing but a black fog. He thought the first explosion took place near the hole next to the Pomona Gardens. The second was nearer the larger hole. The picric stove was not blown up by the first explosion. He saw another fireman getting the hose out nearer to Pomona. He was present when deceased's body was found. It was about two yards away from the place where he had left the deceased, and the head was turned away from the picric stove. In the shed where the fire took place picric acid, nitrate of lead, tin crystals, and, he believed, aquafortis were kept. The picric acid was kept in tubs and stone tanks, and was dried in the tank in bags after having been dried as much as possible in a "whizzer." The nitrate of lead was placed in stone tanks to crystallise, and the crystals were kept on stone shelves. Manchester brown was also kept in those sheds, as well as yellow, and sometimes aurine. On previous occasions he had seen fires in the same place. From the time he heard the alarm to the time of the explosion about three minutes elapsed. There was no water thrown on the place before the explosion.

Joseph Dean said he was the storekeeper at Messrs. Roberts, Dale, and Co.'s works. He was frequently going all over the works, but he did not see the fire when it first broke out. He heard the alarm about six or seven minutes to twelve, and then ran across from the plumber's shop. He saw the fire before the first explosion, and it appeared to him to be about five yards distant from the stove and near to the nitrate of lead tanks, which were in the centre of the sheds. The fire appeared to be on the floor, and was close to some nitrate of lead refuse, a wet pulp, kept in open casks. Witness went inside the shed and stood about four yards from the fire and close to the picric stove. The fire seemed to be floating about. He had seen similar fires before, but not so large as on this occasion. At the previous times the fire had been in the picric acid stove. The flames on this occasion were of a bluish colour, and looked as if sulphur was burning. The floor on which he saw the fire was a clay or gravel floor, and formerly small quantities of picric acid might have been spilled on it. The fire was within a foot of the boiling stove, and was near the two large holes in the ground. Where the larger hole was the floor was bricked, and just about there were two of the picric acid crystallising stoves. He had known previous explosions to take place, but only slight ones. One of the previous fires was attributed to the

[illegible] which this acid con-
[illegible] acid is to be pro-
[illegible] employ, and the
[illegible] upon than with
[illegible] however, make an
[illegible] concerned, which has
[illegible] when the market is flat.
[illegible] we have been able
[illegible] the cost of working
[illegible] a ton of sulphate
[illegible] of the ordinary pattern,

[illegible]	£2	10	0
[illegible]	0	7	0
[illegible]	0	3	6
[illegible]	0	4	6
[illegible]	0	8	0
[illegible]	0	1	0
[illegible]	0	12	6
[illegible]	0	12	0
	£4	18	6

[illegible] material for repairs, general
[illegible] the cost of a ton of
[illegible] the ordinary way, cannot

[illegible] embarrassed with
[illegible] small that it would
[illegible] man's wages to keep
[illegible] to do with it in
[illegible] twice its bulk of water,
[illegible] get rid of the tar
[illegible] late February or March
[illegible] it will almost always
[illegible] A [illegible] of grass land will require
[illegible] liquor per acre, and the
[illegible] must be perfectly
[illegible] with water before
[illegible] pay a little less than
[illegible] arranged for the season,
[illegible] sulphate maker is of no use
[illegible] added to bring the
[illegible] cheap transportation.
[illegible] the farmer is so strong that he
[illegible] ammoniacal liquor a trial; in this
[illegible] might be neutralised
[illegible] crystallising point by means
[illegible] in all gasworks, even the
[illegible] sulphate is produced, but it
[illegible] there is this advantage, that
[illegible] settler, and a few crystallisers,
[illegible] method deserves the careful
[illegible] who have very small quan-
[illegible] and are at present embar-

[illegible]STANT AGENTS FOR STEAM BOILERS.

[illegible] advocacy of the employment of
[illegible] applied to the feed water of steam
[illegible] been said with regard to the com-
[illegible] which various waters produce;
[illegible] a few steam users at the pre-
[illegible] importance of a thorough study of the
[illegible] for steam raising purposes, and of apply-
[illegible] in the most scientific manner.
[illegible] that a normal boiler scale con-
[illegible] sulphate of lime: there are scales no doubt con-
[illegible] carbonate of lime, and magnesia in
[illegible] a microscopical examination of such incrus-
[illegible] show them to be of an amorphous character
[illegible] by interlacing crystals of sulphate of lime.
[illegible] collection many samples of this character,

which show conclusively that had it not been for the sulphate of lime, the solid matter in the water would have formed a mud instead of an injurious scale.

We know of one establishment using water from a canal for steam-raising purposes, of a hardness of 21·9 grains per gallon, nearly all of which exists as permanent hardness or sulphate of lime. The scale produced by this water has the following composition:—

Water, organic matter, &c.	6·14
Silica	1·10
Oxide of iron	1·12
Alumina	2·59
Sulphate of lime	75·59
Magnesia	8·32
Carbonic acid	2·02
Common salt	3·24
	100·12

In another instance the water used for steam-raising was drawn from a brook largely contaminated with the waste lime salts from bleachworks and paper mills. This water was also 21 degrees of hardness, and produced a scale of the following composition:—

Water	4·17
Organic matter	4·63
Silica	7·60
Carbonate of lime	10·26
Sulphate of lime	63·02
Carbonate of magnesia	8·22
Oxide of iron and alumina	2·10
	100·00

In this case some soda-ash was used as a disincrusting agent, but certainly not in sufficient quantity.

It is this point to which we wish to draw attention. Let us suppose a steam boiler consuming 30 tons of fuel per week and evaporating 8 pounds of water per pound of fuel, such a boiler will require 240 tons of water per week, or 52,800 gallons, or 8,450 cubic feet.

At 21 degrees of hardness this quantity of water would contain, equal to 158lb. of carbonate of lime, but as it exists mostly as sulphate, it would require nearly 170lb. of soda carbonate to convert the lime sulphate into lime carbonate. Roughly speaking, it would require about two hundredweights per week of the best soda-ash to do its work properly in such water, or 32 pounds every day. In the case in question, half a hundredweight per month was only used, and this quantity was put in when the boiler was cleaned.

The best form of soda-ash which can be used is what is known as "caustic ash," of which about 10 % of its alkali is in the caustic state, and for this reason:—52,800 gallons of water would in many instances contain about 31lb. of carbonic acid, as dissolved gas, having a tendency to hold carbonate of lime in suspension; if this was neutralised directly it entered the boiler it would cause speedy precipitation of the carbonate of lime, which, in the ordinary way, would only be deposited slowly upon the carbonic acid being disengaged with the steam. The slower the deposition of mud in the boiler, the more likely is it to form scale, by becoming entangled amongst the crystals of sulphate of lime. Then again, it should be supplied regularly with the feed water, and if possible the mixing made in a large tank from which the boiler supply is drawn; it would be far easier to clean out a tank of this description than a steam boiler, with all the attendant losses of time, heat, and wages. It may seem a large quantity to use, 2 cwt. of soda ash per week per boiler, but who can say that his boilers cost less than this amount for cleaning?

BUTTERINE MANUFACTURE.

In another article we have called attention to the manufacture of oleo-margarine and to the use it is usually put, viz., the production of butterine. It may be well at this juncture to explain how this article of commerce, which when once introduced is lost in obscurity, is manufactured.

The fat from which butterine is manufactured is mostly imported from America, where it is made in large quantities. Let us call it oleo-margarine, as its composition is not altered in the slightest by the treatment it undergoes. The oleo-margarine is first melted and passed through sieves in order to retain and keep back foreign matters such as pieces of straw and other things that would not look well in butter.

It is then run into a mixer fitted with an agitator, and agitated with a certain quantity of sour milk. This is simply to give it a flavour, as oleo-margarine has no appreciable taste whatever, resembling in some particulars the silent spirit sent from Calais to Scotland for mixing with Scotch whiskey. After the oleo-margarine has been churned long enough with the sour milk to effect emulsion, the contents of the mixer are let off into a trough, down which ice-cold water is made to flow. Here the melted fat instantly solidifies and floats away as a foam upon the surface of the water, when it is collected by men with rakes and accumulated for the next operation.

It is well known that if fats are allowed to solidfy slowly, most of them become granular and very unlike butter. It is the rapid cooling in this case which gives the butter-like consistency free from granulation, and in some measure assists the emulsion to set as a whole.

After the butterine has been collected from the water-flow, it is passed through mixing rollers with a certain quantity of salt and colouring matter, and finally emerges as the best butterine. It is now ready for sale; it reaches us in the wholesale markets properly labelled "butterine," but who has the temerity to say that it is always sold in the retail markets as such?

THE TWENTY-THIRD REPORT ON ALKALI, &c. WORKS, BY THE CHIEF INSPECTOR.

The usual blue-book is now before us, and before inquiring into the contents we must congratulate the Chief Inspector upon his punctuality. Hitherto this has not been a marked feature of the Alkali Act Reports; but we hope a way has now been found to issue them at an early date after presentation to Parliament. Surely this can be done.

The report of the proceedings during 1886 is very interesting, as showing a continued increase in the efficiency of the various works, the owners of which have been stirred up by the Chief Inspector to effect savings which would otherwise have been lost to them. We now allude to the frequent escapes of chlorine from bleaching powder chambers, found and remedied by Mr. Fletcher's exertions. He has worked at the subject with untiring energy, and as a result a considerable saving has been made by many manufacturers who have adopted his advice. In describing the means employed to moderate if not annihilate this nuisance, the Chief Inspector tells us that at one works 180 tons of additional bleaching powder of a value of £1,200 has been made in nine months, "over and above that which would have been produced had it not been for the use of the apparatus."

There are many interesting tables and series of statistics to be found in this report which we cannot afford space to notice at this moment, but seeing the matters are so interesting and important, we shall devote a series of chapters to them in our next and succeeding issues.

In England the works have been behaving themselves very well, no prosecutions for allowing the escape of noxious vapours having taken place, though ten firms have been proceeded against for non-registration. The extent of damage due to coal-smoke alone is clearly put forth in several ways, which we are pleased to notice, as we feel that until the evils of coal-smoke are clearly recognised there will not be any marked improvement in the general character of our atmosphere.

On the whole, we are able to assert that there has been no break in the continuity of that interesting and valuable information which the late Dr. Angus Smith furnished to the

[illegible] the [illegible] water from the paper mill [illegible] stated that the water was [illegible] in common the same [illegible] increase in the amount of [illegible], and a notable increase [illegible] amounting to from 8 to 12 [illegible] in the water; there was a [illegible] and especially in organic and [illegible] source of pollution, and [illegible] dyeworks. Iron oxide was [illegible] on the cloth if not at once [illegible] increased boiling. Organic [illegible] and mildews. The [illegible] also examined the rocks and stones from the bed [illegible] He had applied hydrochloric acid, and [illegible] a pink or claret coloured solution characteristic of [illegible], and by the application of ferrocyanide of potassium [illegible] detected the presence of iron. The stones from the [illegible] the stream at [illegible] Bridge, from Eagley Bridge, [illegible] river near Messrs. Eden and Thwaite's intake, and [illegible] similar spot near Messrs. Blair and Sumner's works, [illegible] all examined in the same manner, and gave evidences [illegible] similar deposit.

[illegible] were produced taken from Messrs. Eden and [illegible]tes' and Messrs. Blair and Sumner's works, stained in [illegible] and brown, which the witness declared to be due to iron, [illegible] was about to apply some chemical test when his Lordship [illegible] explained that such a proceeding was unnecessary. The [illegible]ness here gave evidence that he had taken the waste dye [illegible] from the trough and diluted it with 320 times its [illegible] of water from the compensation reservoir, and upon [illegible]ing cloth in it he found it to be stained.

His Lordship hereupon interposed, and asked whether that was supposed to be equivalent to water diluted in the natural way; he thought not, as naturally dilution, coupled with a flow for some distance and exposure to the air, would naturally assist in purification. The witness agreed that to some extent it was so.

Cross-examined by the Attorney-General, the witness stated that he had some experience of bleaching but not of dyeing, and could not say anything of what the defendants did other than from the actual analysis of the waters made by himself. He had not guaged the water flowing from the trough over such a long period as twelve hours, but only during a short time by means of the two cubic feet measure. On the 23rd of September last he guaged it, and found it to be 14,000 gallons per twelve hours. He stated he had not the remotest idea of the volume of water passing down the river at Eden and Thwaites' works, or of the combined streams when they reached the works of Messrs. Blair and Sumner, nor had he ever tried the experiment of the maximum amount of iron in water with which it was possible to bleach. When asked if he had attempted to find out the absolute amount of oxide of iron present in various points in the river, he replied in the negative, and gave as his opinion that it was absurd to attempt it. The learned counsel enquired whether it was not a fact that there was (judging from his own analyses) 400 times as much iron in the water of the river at the Egerton thread works than at a point above the paper mill of Chas. Turner and Co., to which the witness replied that he thought he could undertake to say there was not. When pressed to explain what standard he had assumed when he stated that the water at the plaintiffs' works was unfit for bleaching, and that the waste dye-water coming from the defendants' works was sufficient to explain all sources of damage to the plaintiffs' goods, he explained that he had assumed no definite flow in the river; but he had examined the water of the Eagley Brook and found a certain amount of iron, and drew his conclusions from this, and he also found that Messrs. Eden and Thwaites and Messrs. Blair and Sumner each used large quantities of very pure water, and still the amount of damage done to them was exceedingly great.

When asked what amount of iron would do damage in bleaching, the witness stated he would not pledge his word that every gram per gallon would not do damage; but he

und 0·159 and 0·148 grain per gallon of oxide of iron Astley Brook water, close to the intake at Messrs. and Thwaites' works. The witness was also asked er he had examined or analysed any refuse from Messrs. vick's works, from Messrs. Duxbury's paper mill, or Messrs. Chas. Turner and Co.'s paper mill, but nothing e was elicited, except in this last case he had found a erable amount of pollution and iron. He had never ed the water of the Eagley Brook prior to 1880.

this point several pieces of bleached and dyed cloths produced, and it was stated by the learned counsel that ad been bleached with water taken from Egerton Weir, ich the witness pledged his word that it was impossible ach with such water, but he had never tried the experi- himself.

mined as to the method he had employed to determine mount of iron present in the waters, he stated that c. of the water was evaporated to a small quantity, dised by nitric acid, and titrated with a standard mate of potash solution, the quantity of iron being ted by the amount of the standard solution actually used.

en asked whether it was possible to produce stains in dinary course of bleaching from pure water such as in to the stream from its tributaries, he stated he t it was impossible.

n re-examination, the witness stated that the Astley differed very much from the Eagley Brook, inasmuch stones in the Astley bed were clear or covered with growths, and that there is a great variation in the ty and quality of the water passing down the Eagley , so that it may be possible at times to collect a sample ter with which bleaching might be done. He agreed here might be quiet spots on the river where there was ch iron, and others where there was much. Messrs. vick had spent upwards of £12,000 in filtering their dye-water, but he could not give the amount sent in m daily as he had never guaged it. He was of opinion e amount he had stated of one ton per day could not t into the river by the defendants without causing e to the plaintiffs.

Charles Estcourt, city analyst, Manchester, deposed ing collected and analysed samples of water from the y Brook, and had also examined the waste water from ters at Chas. Turner and Co.'s paper mill. Generally, h analyses and conclusions he agreed with the opinions sed by the last witness. He had been to see Messrs. and Thwaites' intake, and had examined the processes ration at those works. He had also examined Messrs. nd Sumner's intake, which he pronounced very bad; o saw the large filtering beds they used for part of their

This witness produced a piece of stained cloth taken the kier after the second "bouck" with soda-ash, that he had applied the prussiate test and found it to iron stain. He stated as his opinion that if all the works on the stream were blotted out, the refuse from fendants' works would do damage to the plaintiffs, and was now no point on the stream where the water was enough for bleaching.

n cross-examination, the witness stated that the lime the water were injurious, the sedimentary matter also, at Messrs. Eden and Thwaites sent their own bleaching into the stream, which found its way down to Messrs. nd Sumner's works. Examined as to what process sed to determine the amount of iron in solution, this s stated that 70 c.c. were taken, ferrocyanide added to ce a blue colour, and this colour compared with that ed by the addition of ferrocyanide to a water containing wn amount of iron. He had made no estimation of the t of water flowing down the stream at various points. dmitted that iron stains might be taken out by the s," or acid employed in a subsequent process of ing, but did not know what strength of "sours" were yed, which he said varied in different works, and was secret.

n re-examination, *he stated he could not find any log- stains upon the cloth, as the colouring matter* would be decomposed absolutely in the bleaching process. Iron held on more tenaciously, but by re-bleaching the stains could be got rid of, but caused extra expense.

[Case proceeding.]

Notes and Queries.

CONVEYANCE OF PETROLEUM.—Two steamers for the Russian petroleum trade have recently been completed at Gothenburg. These vessels, fitted with tanks and having a carrying capacity of 480 tons each, will ply on the Caspian between Baku and Niefat at the mouth of the Volga.

NEW COMPANY.—The International Water and Sewage Purification Company, Limited, has been registered with a capital of £100,000 in £5 shares, 6,000 of which are allotted and fully paid up. The company's object is to manufacture materials for the purification of water and other liquids, and for gases, and for the precipitation and treatment of sewage and excreta.

A PAYING CONCERN.—The directors of the Distillers' Company recommend a final dividend of 12s. per share, less income-tax, which, with the interim distribution of 10s. per share already paid, makes a total dividend for the year of 11 per cent. They further recommend that £15,000 be added to the reserve fund, and £6,000 carried forward.

PROBABLE CLOSING OF LIVERPOOL SUGAR REFINERIES. There is every reason to expect that unless speedy measures of relief are afforded some of the large sugar refineries in Liverpool will be closed, and the hands they employ thrown out of work. This will only be a further extension of the ruin which has already been inflicted on the sugar trade in London, Bristol, Greenock, and Plymouth. The English refiners find it utterly impossible to stand against the competition of foreign manufacturers. On an equal field—that is, free-trade principles—they would have no fear of foreign competition, but the substantial premium which the foreigners receive in the shape of bounties for every pound of sugar landed in this country altogether demoralises the trade. In fact, the home trade in England is being destroyed, and with the ruin of the sugar manufacturers the working men are losing their employment and their wages.

AMERICAN BREWING.—Buffalo is making enormous strides in the brewing industry. As to the number of brewing establishments, it ranks next to New York and Brooklyn. The value of the beer product last year was over $3,000,000, and it is computed that the total output of the Buffalo breweries this year will exceed 400,000 barrels.

THE SCOTCH OIL COMPANIES.—The attempt to unite in some way the interests of the Scottish mineral oil companies and prevent over-competition has resulted so far in an agreement to regulate the price of burning oil. The price of No. 1 quality has been fixed for the season at 5½d. per gallon net at the various works. A penalty of £500 will be imposed for each breach of this agreement. The other products have not yet been dealt with.

DIAMOND MINING.—The London agents of the Kimberley Central Diamond Mining Company Limited have received the following telegram from the company's head office in Kimberley:—"During first fortnight in June Blue Ground hauled 21,000 loads, washed 22,000 loads; estimated value of diamonds found, £24,350." Cash in hand £70,000, exclusive of reserve fund.

FIRE AT A JAPAN WORKS.—Recently the japan works of Messrs. Leach, Flower, and Co., Neath, were almost completely destroyed by fire. The damage amounts to several thousand pounds. Several hundred hands will be thrown out.

RUSSIAN PETROLEUM.—An association has been formed among some important proprietors of camel caravans in Baku with a view to forwarding petroleum overland *via* Mughan to Persia. Some trial consignments have already been made, but none have reached their destination, as the petroleum was eagerly bought up on the road. It is now proposed to despatch caravans consisting of 500 camels.

MILK AS A FEVER SPREADER.—At the last Council meeting of the Royal Agricultural Society some discussion arose on Dr. Klein's allegations at a recent lecture at the Royal Institution as to the communicability of scarlet fever to the human subject by the milk of cows suffering from eruption of the udder or teats. The President, Lord Egerton of Tatton, subsequently wrote to the Privy Council on the subject, urging the desirability of investigation and offering the co-operation of that society. A reply to Lord Egerton's communication has since been received from the Privy Council Office, stating that the inquiry suggested is now being prosecuted, and it is proposed to include all the questions which had been raised in connection with the responsibility of diseased cows in the production of human scarlatina.

THE WEARDALE BARYTES INDUSTRY.—Our Newcastle correspondent writes that the production of barytes—a mineral found in veins—is developing as an industry in the Weardale district. One company has secured a portion of the moors for productive purposes in the locality indicated, and other persons are negotiating to the same end. The same correspondent states that the demand for soda crystals in the Tyne chemical market during the week has been sharp, exciting, and advantageous. The result is an advance, 43s. having been paid, while 45s. has been demanded. The heat of the weather, which checks production, has been ascribed as the cause. Bleaching powder is quoted £7. 7s. 6d. to £7. 8s. 9d., soda ash ⅞d., less 2 per cent.; and alkali 1⅛d., less 5 per cent. In all the last-named branches the demand is quiet.

PROHIBITION OF THE USE OF NOXIOUS DYES.—A bill has been presented to the German Reichstag prohibiting the employment of noxious dyes in the manufacture of alimentary substances, and utensils employed for their preparation. Substances containing antimony, arsenic, barium, lead, cadmium, chromium, copper, mercury, uranium, zinc, tin, gamboge, picric acid, or dinitrocresol are to be prohibited.

DISSOLUTION OF PARTNERSHIP. — The partnership hitherto existing between Mr. George Heaton Daglish, Mr. Harry Bolton Daglish, and Mr. Robert Shaw Daglish has been dissolved, and the business for the future will be carried on under the name of Robert Daglish and Co., chemical engineers, etc. by Mr. Harry Bolton Daglish and Mr. Robert Shaw Daglish.

EXPLOSION AT A ROCHDALE WORKS.—At a late hour on Wednesday night, the 22nd inst., an explosion and fire occurred on the premises of the Rochdale Corporation Gas Residual Works. In the works there is a covered tank for the reception of pitch, and through the mistake of a workman who prematurely opened the tap from the boiler when the tar was overheated, an explosion was caused which ignited the contents of the tank. Mr. Stenhouse, manager of the residual works, and Mr. Ball, manager of the gas-works, soon arrived, and a hose kept on the premises was speedily got to work. The flames were extinguished in about half an hour. The zinc roof was displaced, but the building was not much damaged. A small storehouse for naphtha stands within a few yards of the tank, but the brigades prevented it catching fire. No person was injured, and the damage done was slight.

FRENCH SUGAR.—The Paris sugar market (writes a correspondent) has been subject to but slight fluctuations during the past week. The result of the crop may now be predicted with almost absolute certainty. Prices are firm, which is not surprising, for even with a promising crop it is almost impossible for prices to recede, since the resources of the [illegible]ntry will only suffice to meet the actual consumption. co[illegible]he [illegible]w law contains two articles which will not favour a The n[illegible]; [illegible]rices, the manufacturer will receive a bounty on decline i[illegible] [illegible]witness [illegible]oes not work up, and hence the production all molas[illegible]w [illegible]ently 40,000 to 50,000 tons. Moreover, the will be re[illegible]2·75[illegible] Town sugar is greatly facilitated by provisions exportation[illegible] to [illegible]w. White sugar is quoted for this month's of the n[illegible] for July 32·80f., July-August 33. 10f., refined delivery [illegible] [illegible]yl. sugar of [illegible]

THE ALUMINIUM COMPANY LIMITED.—The prospectus of the Aluminium Company Limited, with a capital of £400,000, divided into 60,000 A shares and 20,000 B shares of £5 each. Out of the profits earned by the company the holders of the A shares will be preferentially entitled—(1) to the whole of the net profits of the business acquired from Webster's Patent Aluminium Crown Metal Company Limited up to 12 per cent. per annum, (2) to four-tenths of the net profits, other than royalties, derived from the sodium patents acquired from Mr. Castner, up to 12 per cent. per annum, and (3) to a similar share of the royalties derived from the Castner patents. The holders of B shares are preferentially entitled to the remaining six-tenths of the net profits, other than royalties derived from the Castner patents up to 12 per cent. per annum, and to a similar share of the royalties. They are also entitled, as regards the United States, to one-third; and, as regards the rest of the world, to one-half of any consideration, except royalties derived from the sale of granting licences under the Castner patents, the holders of A shares being entitled to the balance of such consideration. The surplus net profits, after such dividends on the A and B shares respectively and subject as above, will be divisible over the whole capital. Debentures, bearing interest at 6 per cent. per annum, to the amount of £100,000, will be issued for a term of seven years, but will be redeemable at any time previously at the option of the company at £105 per £100 debenture on giving six months' notice. Applications are invited for 40,000 A shares (the balance being taken by the vendors), and £100,000 £6 per cent. debentures in sums of £100 each. The company has been formed to acquire the patents and work and develop the inventions of Mr. James Webster for the manufacture of pure alumina and certain metallic alloys and compounds, together with the business now carried on by Webster's Patent Aluminium Crown Metal Company Limited, in Birmingham, Sheffield, and London, and also to acquire the patents and work and develop the invention of Mr. H. Y. Castner for the manufacture of sodium and potassium.

THE OIL TRADE IN GERMANY.—The report of the united Saxon and Thuringian paraffin and solar oil manufacturers for the business year 1886-7 shows that the fall in the price of products is gradually increasing. The prices of paraffins are dependent upon those of fat goods, among which palm oil is the principal price regulator. Notwithstanding the increasing commerce with tropical countries from which palm oil is obtained, it is improbable that any lasting increase in the price of this oil will take place, and consequently the prospect of any definite improvement in paraffin, the most valuable product of the above company, cannot at present be entertained. The state of the market for paraffin oils is more favourable in consequence of the syndicate established last year, by which a decline in prices for the greater portion of the inland business is rendered impossible. Though a considerable percentage of last year's production of these oils remain unsold, and a small percentage at minimum prices has been exported, these facts need not occasion any anxiety, for, on the one hand, the home consumption shows indications of increasing, on the other hand the production was exceptionally high. Solar oil is being hard pressed by American and Russian petroleums. A portion of the year's production remains unsold. The following figures show the average prices per 100 kilos for the more important productions in the last two years:—

	1885-6. mks.	1886-7. mks.
Solar oil	14.73	11.60
Dark paraffin oil	10.94	10.24
Hard paraffin oil	107.21	71.03
Soft paraffin oil	52.33	43.17
Paraffin scales	42.77	29.53

The profits did not admit of any dividend being divided among the shareholders. A report, which is identical with the above in all important details, has been published by the Zeitz paraffin and solar oil manufacturers. In this instance, also, no dividend could be declared. An extraordinary general meeting of the united Saxon and Thuringian paraffin and solar oil manufacturers has decided on an amalgamation with the Zeitz paraffin and solar oil manufactory.

The Ross Light.—A new system of oil lighting is at present on trial in London, and is worth the attention of those who burn oil or who pay too much for their gas. Ordinary gas brackets or pendants may be used, the gas burner and tap being replaced by a cylindrical tube, in which the wick is placed. The oil is supplied from a main reservoir to the burners by means of pipes, ordinary gaspipes being utilised for this purpose. The oil is so placed that the supply is at a constant level, so that there is no possibility of leakage at the burners. So far as the oil supply is concerned, it is, therefore, perfectly automatic. In the "Ross" system there is no chimney, but air is supplied to the flame from a meter by pipes exactly in the same manner as gas is supplied. The meter contains compressed air, and this rushes to each flame with considerable force, and changes the dull, smoky flame to one of brilliant whiteness. The light resembles an ordinary gas flame, but is much pleasanter to the eyes. The system is thoroughly efficient and economical. The company, we understand, propose to fix up fittings where desired on the three years' system, and they claim that the cost of the fittings and supply of oil for that period will be less than the sum of the gas bills. This is based on such a calculation as the following:—30,000 feet of gas, at 4s. per 1,000, costs £6; oil at 5d. per gallon sufficient to give the same amount of light costs £1. 7s. 6d.—that is, 2¼ gallons of oil give a 16-candle power light for two hundred hours, which represents the capabilities of 1,000 feet of gas.

Poisoning by Arseniuretted Hydrogen. — From the published reports of an inquest held in Wolverhampton regarding the death of Joseph Key, a labourer in the employ of Messrs. E. W. T. Jones and Co., we learn that arseniuretted hydrogen is a gas likely to be given off in certain industrial operations and to cause loss of life. In this case the deceased had been engaged in endeavouring to move an agitator fixed in a still containing flux skimmings and water, was immediately afterwards seized with illness and died the following day. Dr. C. A. MacMunn stated his opinion that the deceased had probably inhaled arseniuretted hydrogen, as he had discovered by Reinsch's test a quantity of arsenic sufficient to account for death. He stated that deaths from inhaling arseniuretted hydrogen were of very rare occurrence, only ten or twelve cases being known to the profession. Mr. C. A. Newnham agreed with the evidence of Dr. MacMunn, but was quite at a loss to understand how the gas had been formed. Mr. E. W. T. Jones stated that he thought there had been some occluded gas in the flux skimmings, but it had not been given off by any chemical action, or the other men who went into the boiler after the deceased would have suffered also. The jury returned a verdict of "Accidental death," and added a rider, that inasmuch as it had been ascertained that the process at the works of Messrs. Jones and Co. generated arseniuretted hydrogen, more care should be taken in this work in the future.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday Morning.

Most of the local products still suffer from depression, but soda crystals and sulphate of ammonia are exceptions, the renewed intensity of heat last week being the main cause as regards the former. On Saturday, the glass registered 82·7 in the shade and 132·2 in the sun, figures untouched here for quite twenty-five years. One cause of firmness in sulphate of ammonia (it is said to have been done for spot as high as £13) is the prospect of close combination by all the Scotch makers (from shale), an adjourned meeting to that end being held in Glasgow to-day, and meanwhile salesmen naturally fight shy of extended forward business. It is calculated that were the proposed amalgamation of manufacturers carried as a permanency, which is very doubtful indeed, the leverage thus acquired would of itself raise sulphate of ammonia 30s. a ton, scale ¾d. per lb., and shale oils and spirits in proportion. General current prices are—soda crystals, 45s. net Tyne; lump alum, £4. 17s. 6d., less 2½ % *Glasgow*; borax, £31, and boracic acid *£46, net Glasgow*; soda-ash 1d., less 12 % Tyne; caustic soda, 76° white, £9. 10s., 70/72° £7. 17s., 6d., and cream £6. 10s., less 2½ % Liverpool; bicarbonate of soda (in 5 cwts.) £5. 10s., and cwts. £5. 15s. net Tyne; refined alkali, 1⅛d., less 4 % Tyne; salt-cake, delivered Glasgow and district, about 30s.; chlorate of potash, 6 1/16d., less 5 %; and a slackened business in bleaching powder, variously reported at £7. 10s. to £8., less 5 % Glasgow. Home demand for colouring chemicals is weaker, Scotch dyeworks being comparatively idle; but Ayrshire works have done fair forward booking in bichromate of potash for both England and the Continent. Bichromate of soda sales have fallen off. Glasgow imports for the week included 50 tons general chemicals from Liverpool, and 630 barrels of paraffin scale from New York.

THE TAR PRODUCTS MARKET.

Hot and fine weather generally bring on a scarcity of benzol and other tar products, and no doubt this is occurring now, but prices do not seem to be moving upwards. The war scare being over, carbolic has sunk to its normal level, though there is a considerable demand for it just now for disinfecting purposes. Several tar contracts are open, and it will be interesting to watch how much is bid for them. We wish to call attention to the Manchester and Harrogate advertisements upon the front page.

THE SULPHATE OF AMMONIA MARKET.

Prices have been well maintained, and it has been reported that as much as £13 has been paid for spot delivery. The hot and fine weather has had much to do in hindering production, so that there is an absolute absence of parcels coming forward. After all, the quantity exported is not great, which shows how very scarce the article is. Much of the scarcity is due no doubt to the larger quantities used at home by farmers, and there is no doubt that when the great increase in crop is noticed by the friends of those who have used it this year, that the home consumption will be considerably extended next season. The circulars and pamphlets issued by the Sulphate of Ammonia Association have borne fruit, and the German manufacturers are now circulatiug a translation of the pamphlet amongst the agriculturalists on the Continent.

THE PATENT LIST.

8913. Catherine Possoz. Improvements in frigorific processes applicable for the manufacture of ice and other purposes. June 22.

8922. W. N. Hartley and W. E. B. Blenkinsop. Improvements in the manufacture or preparation of cobalt sulphate, and its separation from other sulphates. June 22.

8929. Hermann Güttler. An improvement in the manufacture of charcoal for explosives and other purposes, and apparatus for that purpose. June 22.

8932. A. Ewer, Paul Pick, and Martin Lange. Process for the preparation of sulphuretted derivatives from the aromatic oxy-compounds. June 22.

8947. George Tall. Improvements in the manufacture or purification of cottonseed oil. June 23.

8953. R. B. Avery. New and useful improvement in method and apparatus for generating gas or gases for illumination, heating, and metallurgical purposes, from liquid hydrocarbons and steam, and liquid hydrocarbon and air. (Complete specification.) June 23.

8957. Henry Defty. An improved process of extracting and refining metals from ores. June 23.

8969. Henry Gardner. A novel process of manufacturing pulp for paper, and in apparatus for the purpose. June 23.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

		£	s.	d.
ACIDS:—				
,, Acetic, 25 %	per cwt.	0	10	6
,, Arsenic...	,,	0	15	0
,, Chromic	per lb.	0	0	8
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.,	per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ...	,,	0	2	6
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous...	,,	0	0	3
,, Oxalic	,,	0	0	4
,, Sulphuric (fuming %)	,,			
,, ,, (Brimstone 168°) ...	per ton	4	5	0
,, ,, (Pyrites 168°)	,,	3	10	0
,, ,, (spent oxide 168°) ...	,,	4	0	0
,, ,, (,, 150°) ...	,,	2	5	0
,, ,, (Pyrites 150°)	,,	2	0	0
,, Tartaric	per lb.	0	1	7
Alum...	per ton	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3½
,, = 24°	,,	0	0	1⅞
,, Carbonate	,,	0	0	3½
,, Muriate	per cwt.	1	2	6
,, ,, (sal-ammoniac) ...	,,	36/- & 34/-		
,, Sulphate (grey), London ...	per ton	12	15	0
,, ,, (grey), Hull	,,	12	12	6
Aniline Oil	per lb.	0	0	10½
,, Salt	,,	0	0	9
Antimony...	per ton	32	10	0
,, (tartar emetic)	per lb.	0	0	11
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	3	15	0
,, Sulphate (native levigated) ...	,,	3	10	0
Bleaching Powder, 35 %	,,	7	5	0
,, Liquor, 7 %	,,	2	10	0
Bisulphide of Carbon	,,	13	0	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	5	0
COAL-TAR PRODUCTS:—				
Anthracene, 30 % f.o.b. Goole,	per unit per cwt.	0	1	0
Benzol, 90 % ,, ...	per gallon	0	3	6
,, 50 % ,, ...	,,	0	2	8
Carbolic Acid (crystallised 35°) ...	per lb.	0	0	11½
,, (crude 60°)	per gallon	0	2	9
Creosote (ordinary)...	,,	0	0	1
,, (filtered for Lucigen light)	,,	0	0	1½
Crude Naphtha, 30 % @ 120° C.	,,	0	1	2
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ...	,,	0	13	6
Coke-oven Oils (crude)	per gallon	0	0	1
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	40	2	6
,, Sulphate	,,	14	0	0
,, Oxide (copper scales)	,,	36	10	0
Glue	per cwt.	1	17	6
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	52	10	0
Iron (turnings)...	,,	1	13	0
,, Peroxide (blue billy)	,,	0	7	0
,, ,, (bog ochre)	,,	1	13	0
,, ,, (precipitated	,,	3	0	0
,, Sulphate (copperas)	,,	1	2	6
,, Sulphide (antimony slag)	,,	1	1	0
Lead (sheet) for cash	,,	13	15	0
,, Acetate (white)	,,	26	0	0
,, Nitrate	,,	22	5	0
Magnesium (ribbon and wire)	per oz.	0	2	6
,, Chloride	per ton	2	5	0
,, Carbonate	per cwt.	1	17	6
Magnesium, Hydrate	per cwt.	0	10	0
,, Sulphate (Epsom Salts) ...	per ton	2	10	0
Manganese Sulphate	,,	19	0	0
,, Borate	per cwt.	2	5	0
,, Ore, 70 %	per ton	2	10	0
Methylated Spirit, 60° O.P.	per gallon	0	2	4
OILS:—Castor	per cwt.	1	4	6
Cocoa-nut	per ton	26	0	0
Cotton-seed	,,	21	15	0
Colza	per ton	25	0	0
Linseed	,,	22	10	0
Lubricating, Scotch, 885°—890° ...	,,	5	17	6
Oleine	,,	18	0	0
Palm	,,	20	0	0
Petroleum (refined for burning) Russian	per gal	0	0	5
,, ,, American	,,	0	0	5 7/16
Rape	per ton	24	0	0
Rosin	,,	10	10	0
Sperm	per cwt.	2	15	0
Whale	,,	1	0	0
Silver (metal)	per oz.	0	3	8¼
,, Nitrate	,,	0	2	8
STARCHES:—				
Sago	per cwt.	0	8	9
Potato (farina)	,,	0	10	3
Rice	,,			
Sodium (metal)	per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 %	per ton	5	10	0
,, ,, (Caustic Soda-ash) 48 %	,,	4	0	0
,, ,, (Carb. Soda-ash) 48 %	,,	4	2	6
,, ,, (Soda Crystals)	,,	2	10	0
,, ,, (Crystal Carbonate) ...	,,	5	6	3
,, Chlorate	per lb.	0	0	7½
,, Borate (Borax)	per cwt.	1	7	6
,, Bichromate...	per lb.	0	0	3½
,, Hydrate (74 % Caustic Soda)...	per ton	8	10	0
,, ,, (70 % Caustic Soda)...	,,	7	15	0
,, ,, (60 % Caustic Soda, white)	,,	6	15	0
,, ,, (60 % Caustic Soda, cream)	,,	6	7	6
,, Bicarbonate	,,	6	5	0
,, Hyposulphite	,,	5	5	0
,, Nitrate (95 % ex ship. Liverpool	per cwt.	0	9	0
,, Silicate (glass)	per ton	5	10	0
,, ,, (liquid, 140° Tw.)... ...	,,	5	2	6
,, Sulphate (Salt-cake)	,,	1	4	6
,, ,, (Glauber's Salts) ...	,,	2	2	6
,, Sulphite	,,	5	17	6
Potassium (metal)	per oz.	0	4	0
,, Bichromate	per lb.	0	0	4½
,, Carbonate, 90%	per cwt.	0	19	6
,, Chlorate	per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ...	per ton	23	10	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 %	per ton	11	15	0
,, Muriate, 80 %	per ton	9	5	0
Strontium Hydrate, 40 %	per cwt.	10	0	0
Sugar, Beet	per cwt.	0	12	9
,, Cane	,,	0	15	0
Sulphur (Flowers)	per ton	9	5	0
,, (Roll Brimstone)	,,	6	0	0
Superphosphate of Lime (28 %)	,,	1	16	0
Tallow	,,	21	15	0
Tin (metal)	,,	102	10	0
,, Crystals	per lb.	0	0	6⅞
Zinc (Spelter)	per ton	14	10	0
,, Chloride (solution 96° Tw.)	,,	5	15	0

TURDAY, JULY 9, 1887.

ON OF THE EAGLEY BROOK NEAR BOLTON.

ay, June 28th, this case was again resumed astice Kay. Mr. W. H. Collins was recalled very of samples to Dr. Percy Frankland, and nd Mr. Thwaites were also recalled with the

Frankland was then called, and stated that he t 12th last visited the Eagley Brook. He went per mills of Messrs. Charles Turner and Co., e apparatus for settling their effluent, and a cted of a great depth of cinders. He found ercolating from this cinder filter, which was r, and, to the eye alone, appeared of good le travelled up to the defendants' trough, but nuch running from it, though there were evi- times there was probably a much larger flow, d that the bottom and sides of the trough were fibrous organic matter. He noticed that the er was everywhere stained in a most remark- and all the pools about were as black as ink, opinion that the whole of the polluting matter he stream and finally reached the plaintiffs' ere was no possibility of the polluting matter d. He stated that the effluent water from the ough was worse than London sewage in its omposition. In suspended matters it is about don sewage, while in organic matters it is much tated he was generally acquainted with the pro- ed in bleachworks, and he was of opinion that matter put into the stream by the defendants very prejudicially upon such processes as were plaintiffs. He stated that most conspicuous lements of contamination were the organic and edients, and the great increase of hardness and f compounds of iron in the analyses bore out scription he had given of the water. He stated r above Charles Turner and Co.'s paper mill inion, very unfit for bleaching, and below this though there was much less dissolved matter e in suspension, and was in his opinion a very ough it may be less unfit for bleaching than in tance. The witness also stated that he had of the stained cloth, and had seen tests applied the nature of the stains in a very marked way. een iron stains, and did not find the water fit at any point between the defendants' trough iffs' works.

ned, the witness stated he had only visited the on one occasion, and that was on August 12th, not remember what the state of the weather y. He did not know of any action that could ich could possibly destroy the foul matters, as not a highly aërated one, and no matter with of water the waste was diluted, the ingredients found at the plaintiffs' works. When asked od he adopted in estimating the iron, he stated ated the quantity existing in No. 3 gravi- d that he had not separated any alumina or d which might have been there, though he did could be very much. No. 4 was done by the ethod mentioned the previous day by Mr. rt. When questioned as to whether he had amount of iron in solution or suspension, the he had not done so, as at one time the iron ble and at another insoluble, but if it was uble the nature of the river would not allow o remain long anywhere; it might be tem- d, but a flood would carry it down the stream. so stated that ordinary water to render it fit purposes, should *not contain more than 0·21 ou of oxide of iron.*

Re-examined, the witness stated that he had seen a table of matters used at the Belmont Works, and he was of opinion that judging from what he saw coming from the defendants' trough, and speaking generally, there was a sufficient quantity to reach the plaintiffs' premises and to interfere with the processes of bleaching. If the iron was thrown down mixed with logwood refuse, the mixed substances would be carried down the stream, and if iron was present, either in solution or suspension, it could not be got rid of.

In reply to his Lordship, the witness stated that he did not see the water below the junction with Charles Turner and Co.'s effluent except at a distance, but he saw that the stream was running freely. He was not able to make any comparison of the flow at Dunscar Bridge as compared with the volume passing at Charles Turner and Co.'s paper mill; nor could he form any comparison of the flow at Dunscar Bridge and Messrs. Eden and Thwaites' mills; could not tell whether there was more or less. He agreed that at times it might be possible that the waste would be so diluted with flood water as to render its use for bleaching admissible, that is, if the back end of the flood be taken, after the bed of the stream had been well washed out.

The witness stated that the hardness of the water was due to lime and magnesia, but Clarke's process of softening could not be applied to a water containing so much organic matter as settling or filtration would be so very difficult, and, in fact, this process would be practically impossible.

Mr. Ince, Q.C., then summed up the plaintiffs' case, after which the Attorney-General addressed the Court on behalf of the defendants.

The first witness called was one of the defendants, Mr. E. Deakin, who deposed to the quantities of materials used in the works; he stated that he desired to make a correction as to the quantity of iron used. He had discovered that about two loads per year of old iron were dissolved in the nitric acid, already given in the answers to interrogatories, and that iron had not been taken into account as it consisted of old horseshoes and other scrap iron about the works, of which no account had been kept. He proved the taking of various samples and sending them to various analysts.

George Almond, engineer and draughtsman, was then called, and proved taking a large number of samples of the water from various points, and delivering the same to Mr. J. Carter Bell. He also deposed as to the gauging of the water from various streams, from which he had deduced that no less than thirteen million gallons passed over the Egerton weir per day, taking an average of the whole year, and that by the time the stream had arrived at Blair and Sumner's intake the total flow of water had reached the sum of twenty-six million gallons. He also explained to his Lordship the method he had adopted to determine the amount of water flowing down the stream. Cross-examined by Sir Henry James, the witness admitted that the water above Charles Turner and Co.'s paper mill varied in colour with the amount in flow at the trough and with the state of dilution, the trough-water obtained, by mixture with that coming in from tributary streams. He had taken several barrels of water from the stream and delivered the same to the foreman bleacher to bleach with.

Mr. J. Carter Bell, Associate of the Royal School of Mines, analyst for the boroughs of Birkenhead, Salford, Stalybridge, Glossop, and Congleton, analyst for the county of Chester, F.I.C., F.C.S., examined by Mr. Martin, Q.C., stated having received samples of the water at various points from Messrs. H. and E. Deakin, he handed in a statement of the results of the analyses he had made of the samples, especially as to the amount of iron found therein. He had received ninety-one samples of the water taken from the Goyt above Ryecroft, and ninety samples from the brook above Charles Turner and Co.'s paper mill. In testing he took a measured quantity from each bottle, and mixed these quantities together to form one average sample which he had tested and analysed. The results were to be found in the tables handed in. The witness stated he had visited the river on several occasions (about fifteen), and had taken ninety samples of the water at various points. Here witness handed in a table of

results of analyses made by him of the samples of water he had collected from April 2nd to December 8th, 1886. He had received a stone jar of water from Mr. E. Deakin and had analysed it, and had also performed some bleaching experiments with it, which were entirely satisfactory. He had analysed the water from the Goyt above Ryecroft, and was of opinion that it was a very good water for trade purposes. From the stream above Charles Turner and Co.'s paper mill the witness stated he should not like to say it was a good water, nor below Charles Turner and Co.'s paper mill either, as at that point it contained a great deal of suspended matter which came from the paper mill. On the other hand he considered that the outflow from Egerton reservoir was of very good quality, and was according to his analyses a very good water for trade purposes. He had visited the reservoir fifteen times, and was perfectly satisfied that the samples sent to him as coming from this point by Mr. Deaken were fair samples, as the results of the analyses agreed generally with the results of the samples he had himself taken. He had taken the samples at this point from the crest of the weir, and he understood that the person who took the other samples was instructed to take them at the same place. There was a lesser quantity of peroxide of iron in the water from the Egerton weir than at any point between it and the weir at Belmont reservoir, and this was due to the great dilution occurring at Egerton reservoir and the settling which took place there. Taking a flow of thirteen million gallons per day at this point, 0·72 grain per gallon of peroxide of iron would mean at least 132 tons of iron oxide flowing down the stream per annum.

Examined as to the quantity of metallic iron which would be required for solution in the nitric acid mentioned by the defendants as being used, the witness stated that 16 tons of nitric acid would require about 3 tons of metallic iron, or roughly, one-fifth of its weight, the nitric acid being of a strength of 80° Tw.

The witness again stated he had bleached some yarn with the water from Egerton weir, and had also tried some experiments in dyeing, and found that the water in question had not the slightest effect on any delicate colours. Respecting the iron sent into the stream by the defendants, the witness stated that it would be so diluted before it reached either Eden and Thwaites' or Blair and Sumner's intake, that it would be practically lost. Gold, or strychnine poured from the trough in the same quantity would be reduced to a mere trace at Blair and Sumner's, so that they could not be detected; three grains of iron in the effluent would be inappreciable at Egerton weir, and would not affect the water at that point for trade purposes. Practically most of the iron would be got rid of by settlement.

Here his Lordship interposed—So he positively denies what Dr. Percy Frankland says.

Mr. George E. Davis, chemical engineer and consulting chemist, was next examined. He stated he had visited the stream for the purposes of this case on several occasions, and had walked the whole of the distance up the river, from the intake of Blair and Sumner's works at Turner's bridge, to the Belmont works, a distance of about seven miles. He had taken the figures supplied by the plaintiffs' chemists, and calculated the amount of iron present in the effluent water and in the river, the volume of the effluent water being taken from figures supplied by Mr. Collins and of the river from Mr. George Almond's gaugings. According to Mr. Collins' figures the defendants were putting in from 3 to 6lb. of iron daily; while according to Mr. Collins' and Mr. Estcourt's figures the total quantity of iron present at the plaintiffs intakes could not be less than from 3,000 to 4,000lb., therefore it was quite clear some persons other than the defendants were doing the damage complained of. The case was then adjourned until July 5th.

BUTTERINE.

ecent article in the *Manchester Guardian* it is stated *ough the Select Committee* has not yet reported, it is known that the middle path has been chosen. It i stated that this is not the time to interfere with th the people except for the purpose of making sure tha not be adulterated, and of seeing that fraudulent in are not passed off as genuine articles. With this w but we also think that if any expenses are inc preventing fraud, the introducers of the article—th facturers of it—who certainly have the lion's shar profit, should be called upon to meet those expense should such expenses be paid out of the Imperial ex and finally by individuals who do not wish for butteri in fact, never eat any except what is sold them in a fr manner?

There are several statements in the article alluded demand closer attention. It is said, for instance, " traders in butterine to describe that article as 'oleom or 'margarine' would have been unjust and misl We do not think so; but as the name has been so use without protest on the part of the makers of pur we do not see why the alteration should take pl Manufacturers now-a-days must be wide awake, and have been known to the agricultural interest long butterine was simply oleomargarine which had been up with a little sour milk to give it a flavour. As garine, the new article would not have found extensive sale as it meets with now under the butterine, and the man who devised this latter de was wise in his generation.

The statements that "probably no one would pr good butterine to good butter" and "many would rather have high-class butterine than inferior butte be received with very great caution. The write article in question seems to have overlooked the Mr. Handasyde Dick gave evidence before th Committee "that on board his yacht and in his h town and country he always used butterine, w preferred to any butter he could get." The other s respecting high-class butterine and inferior butter is vague in its nature that nothing can be learned from is butterine, then, and butterine, and it would be jus when talking of inferior butter first to make sure th not contain some proportion at least of what we butterine.

It is a notorious fact that butter is very ex adulterated with butterine, and this is what the re makers wish to see stopped. It is not by any means to the lower class of dealers, and we would suggest dairy farmers should appoint local inspectors in ev to see that what is sold as butter, no matter at what only the genuine and unadulterated article. Could Royal Agricultural Society take the matter up, or way lend a helping hand?

THE TWENTY-THIRD ALKALI ACT REP

I. THE CHIEF INSPECTOR'S PROLOGUE.

It may seem anomalous that notwithstanding the d trade the list of chemical works continues to increa report before us states that the number of works unde tion is 910, or, including those in Scotland, 1,048, increase of 13 English works and three Irish work the year. When we come to inquire, however, we that most of the works forming the increase are re works, and have by this means come under the ey inspector, and there is no doubt but that at some fut we shall have every gasworks working up its own am liquor instead of selling it for cartage to a distance, a in most works now.

In alkali works there has been a serious decre numbers showing a diminution of 14, which indica unmistakeable manner the effect of the ammonia-s cess on the Leblanc industry. The Leblanc ind ceased to grow; it cannot hold its own against a ammonia-soda. Mr. Fletcher tells us that 627,75 salt were decomposed during 1885, but only 613,10

551 in England, and while Scotland decomposed 36,800 tons in 1885, there were but 36,139 tons in 1886. The decrease does not, however, affect the whole country, but chiefly the North of England, where there was a decrease of nearly 20,000 tons; Cheshire, Lancashire, and Widnes, together with other districts, have held their own. Salt-cake has in fact been made solely for the bleaching powder and chlorate of potash, which could not otherwise have been produced.

The amount of soda made by the ammonia-soda process has steadily increased, and it now reaches the total of 95,000 tons annually. Foreign works making this article are also increasing, so that the outlook of the Leblanc makers is not bright. A paragraph in our Notes and Queries column on this subject shows that Russia will soon be in a position to supply herself entirely from the Solikamsk and Ekaterinoslay works of Y. Lubimoff and Co., who will soon be turning out over 40,000 tons of alkali annually.

What the English alkali makers will have to learn is, that they must throw over their old rule of thumb working and place themselves in the hands of good chemical engineers; the work must be done scientifically, and not left so much as it is even now, in many cases, to the prejudices of Tom, Dick, or Harry. The ammonia process, as well as the manganese recovery process, are both examples of the dilatory action of the makers of Leblanc soda. It was in 1838 that Dyar and Hemming patented their ammonia-soda process, at a time too when the ammoniacal liquor of the gasworks could have been had for the carting away; yet it was not until sulphate of ammonia had become worth £17 per ton that the process was practically worked in this country. Let us give up that constant railing against foreign competitors which some of our newspapers are so fond of indulging in, and impassionately inquire into the details of the case. Leblanc, a Frenchman, devised the soda process, which only settled in England on account of cheap salt, limestone, and coal; the ammonia process was perfected abroad by M. Solvay, and introduced into England as a practicable process by Mr. Ludwig Mond. Surely England has not much to boast of in either of these connections. Have they anything to boast of in the Leblanc process they now carry on? Are they as careful in obtaining the maximum yield from their raw materials as foreign manufacturers are? The answer to this may be found in Mr. Fletcher's report. Year by year complaints had been made of the escape of chlorine from bleaching powder chambers. It was well known that in most cases the chambers contained a superabundance of chlorine after the chambers were "finished," so that it had become a universal custom to open them in early morning before the world was awake. Of course this chlorine escaped into the air, and it is not to be wondered at that the complaints were many.

Some manufacturers even in 1873 had recognised the existence of the evil of allowing so much chlorine to escape into the air, and had devised means for its prevention. At one works it had become the custom to only pack half the chamber at a time, turning the other half—the half, packed, was again limed, and this half-finished powder absorbed all the free chlorine before the chamber was opened again. At another works within our knowledge the waste chlorine was evaporated by means of a fan, and conveyed to a series of shelves on which fine lime was placed. This absorbed the chlorine and produced a certain quantity of weak bleaching powder, which was mixed off with the strong, or sold as such if required. It is just eleven years ago since this was done, yet Mr. Fletcher has to chronicle escapes of chlorine amounting to 75 grains per cubic foot in the year 1886.

And what is the financial result of the compulsory stoppage of chlorine escapes? It shall be told in Mr. Fletcher's own words:—"In this way additional bleaching powder to the extent of from 5 to 10 cwt. is gained in every chamber. During the nine months this process has been in operation, no less than 180 tons additional bleaching powder has been made," and this is only the experience of a single works.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

VI. HYGIENE.

In an exhibition of such a varied nature as that in Manchester the subject of Hygiene could not be expected to contain a very great variety of exhibits, nevertheless the department is well organised, and contains a few novelties it is well to see, that the public may become familiarised with them. Mr. Benger's preparations of the natural digestive ferments, peptonised foods, and peptonising fluids and powder are shown at Stand 723. They have an enormous sale, as all of them are largely prescribed by the members of the medical profession. The wool-fat — Lanoline — is exhibited by Messrs. Burroughs, Wellcome, and Co., and compounds showing its application in medicine and surgery. Lanoline pomade, lanoline soap, lanoline cold cream, lanoline hoof ointment, may all be found in Case 724. The remainder of the section is devoted nearly entirely to disinfectants, whose name is now Legion. Nearly every substance which will oxidise, or reduce, or poison is brought forward as a disinfectant; but we are pleased to find that in this instance the exhibits are all of a practical nature, and of such a character that they may be safely used in any household.

Messrs. James Woolley, Sons, and Co. have very handsome cases at 725 and 785, containing many beautiful preparations. Amongst the antiseptic preparations we notice phenate of soda and the "sanitary rose powder," of which this firm make a speciality. In Case 785 may be found many preparations and new remedies, including cocain, antipyrin, antifebrin, urethan, salol, and others. There are also specimens of soluble flavouring essences and other articles used in the manufacture of mineral waters. The specimens of thymol and benzoic acid are remarkably good.

At Stand 726 Messrs. MacDougall Bros. exhibit specimens of their various disinfectants, which are well known the world over. Most of our readers will remember that in 1854 Dr. Angus Smith and Mr. MacDougall took out letters patent for a sulphite of magnesia disinfectant, and this when mixed with carbolic acid form the compounds now exhibited. Some time ago, this firm recognising the danger of stopped drains arising from the use of the ordinary disinfecting powders, introduced a new form in which the base is a soluble salt, which washes away with the flushing water in a state of solution, this is certainly an advance upon the old form of powders. Messrs. MacDougall are also makers of carbolic acid for medical and manufacturing purposes, and also of carbolic and ordinary soaps.

Messrs. Morris, Little, and Son, of Doncaster, show at Stand 727 a good collection of their soluble phenyle disinfectants and deodorisers, which many other firms have tried from time to time to imitate. It is said that imitation is the best form of flattery, so in this case "soluble phenyle" must be regarded as a success. We know it is very largely used amongst farmers, and in the bill of entry returns from some of the principal ports we have noticed that it is largely exported. The disinfectants made by this firm are reported to be less poisonous and less corrosive than those made from pure carbolic or cresylic acids.

Messrs. Winser and Co. show, in Case 728, a collection of substances more or less connected with the subject of Hygiene. There is a new substance called "salufer," an antiseptic and disinfectant, the composition of which is not indicated; zinc, barium, and magnesium salts are also shown, as well as sulphate of lime in various forms, china clay, French chalk, whiting, ultramarine, ochres, and umbers.

Hydroleine sanitary soap powder, and also hydroleine for wool-scourers, woollen manufacturers, dyers, and other trades are shown at Stand 729 by Messrs. F. J. Harrison and Co., of Leicester, and we have heard from several manufacturers who have used this article that it does its work well and quickly—much more so than ordinary soap, and with far more ease and less labour.

Messrs. Swan and Leach, exhibition agents, have charge of Stall 730, in which are exhibited the various forms of purifying, disinfecting, and sanitary compounds known as

Jeyes'. Jeyes' perfect purifier, soaps, and non-poisonous sheep dip are amongst the articles exhibited.

It will thus be seen that the articles in this section might better have been described as disinfectants, and it would be as well if the public would study this subject a little, as an enormous amount of trash is distributed under the guise of disinfecting powder. In many cases the waste lime of the works is mixed up with ordinary creosote, and sold to Local Boards of Health, and even to Corporations at a high price, certainly three or four times its value; in other cases some trade refuse or another is ingeniously introduced as a basis or absorbent for some of the oils obtained as a refuse in the coal-tar distillation. Price has but little to do with quality and cannot be taken as a guide, as the bulk of expenses come upon the packing and distributing operations.

In our next issue the exhibits relating to destructive distillation will be described, taking the liberty however of subdividing the exhibits into—*a*, Destructive distillation proper; *b*, Sundry substances made from intermediate materials; *c*, Artificial colouring matters.

(To be continued.)

THE SIXTH ANNUAL MEETING OF THE SOCIETY OF CHEMICAL INDUSTRY.

ON Wednesday, July 13th, the members of the Society of Chemical Industry will hold their sixth annual meeting, in the Chemical Lecture Theatre of Owens College, to receive the report of the council and treasurer, to elect office bearers, to hear the president's address, and to fix the place for the next annual meeting. After the business has been disposed of, members will be left free to visit the Royal Jubilee Exhibition at Old Trafford, and at 7 p.m. the annual dinner will take place in the Palm House in the exhibition. The committee of the Manchester Chemical Club has given permission for the use of the club rooms as the headquarters of the society, so that members can have their letters addressed there.

MR. DAVID HOWARD, PRESIDENT.

On Thursday, the 14th instant, the following visits to works have been arranged:—Messrs. Crossley and Co., engineers; Messrs. Beyer and Peacock's, engineering works; Messrs. Kerr and Hoegger's, dyeworks; Messrs. Ermen and Roby, sewing cotton manufacturers; Messrs. S. Knowles and Co.'s, printworks; Mr. J. Hollingworth, Ashwood Dale lime works; Charles Truby and Co.'s, aniline works; Mr. Isidor Frankenburg's, indiarubber works. In the afternoon the spinning mills of Messrs. Howarth and the paperworks of Messrs. Chadwick and Taylor will be visited, together with the Gas and Sewage Works of the Salford Corporation. An excursion to the Wrexham Lager Beer Brewery will also be made this day, and a visit paid by the River Dee to Eaton Hall, the seat of the Duke of Westminster. On Friday there will be an excursion to Castleton, and another to Glossop. The excursion to Wharncliffe Crags is now struck out.

The first general meeting of this society was held in London, on June 28th, 1881, on which date there were but 297 members. After an interval of six years there are found to be nearly 2,500 members on the roll. All this increase no doubt is due to the establishment of the Journal, which costs the society upwards of £1,800 per annum.

SIR HENRY ROSCOE, M.P., CHAIRMAN OF THE MANCHESTER SECTION.

The creation of the various local sections has had no doubt much to do with the prosperity of the society. Each local section has been a nucleus round which country members have gathered, and the amicable rivalry which has shown itself in many ways between the various local sections has helped to strengthen the society numerically, and to deal a blow against centralisation which, if followed in this case, would be a fatal mistake.

The London section was formed late in 1881, and a list of its officers appeared in the first number of the Journal; then came the Liverpool section, formed in May, 1882; Manchester in February, 1883; in the same month the Newcastle Chemical Society was transformed into a section of the society; the Birmingham and Midland section was inaugurated in November of the same year; the Glasgow and West of Scotland section in January, 1884; the Nottingham section in June, 1885; and the Bristol and West of England section in November of the same year.

The first annual meeting was held in Manchester in 1882, on July 5th, 6th, and 7th, under the presidency of then Professor Roscoe; the second meeting was held in London, under the leadership of Sir F. Abel; the third annual meeting was at Newcastle-on-Tyne, while Mr. Walter Weldon was president; the fourth in London, under the presidency of Mr. W. H. Perkin; the fifth in Liverpool, with Mr. E. K. Muspratt as the chief officer; while the sixth annual meeting finds the society again in Manchester, and this time the president is Mr. David Howard, the well-known manufacturer of quinine and other alkaloids, of Stratford, near London, while, strange to say, the first president of the society, Sir Henry Roscoe, represents the Manchester section as its chairman.

MR. J. CARTER BELL, LOCAL HON. SECRETARY.

We present our readers with portraits of the President of the Society and of the Chairman of the Manchester Section, together with that of Mr. J. Carter Bell, the Manchester Local Hon. Secretary, through whose untiring energy the present meeting has been organised. We have been informed that a guarantee fund of nearly £800 has been raised to defray expenses incidental to this meeting, which, if the weather continues fine, promises to be quite as interesting, if not more so, than any which has yet been held. The attraction to Manchester is the Royal Jubilee Exhibition, and we think that so far as regards that portion devoted to machinery in motion, at least, the members of the Society of Chemical Industry who visit it will agree with us that it is the finest collection of machinery that has ever been brought together under one roof.

Correspondence.

THE PORION EVAPORATOR.

To the Editor of the Chemical Trade Journal.

Dear Sir,—I have just read paper in *Chemical Trade Journal* on the performance of the Porion evaporator which, I think, requires some explanation.

It is stated that at Inveresk Mills 70 tons of water daily were evaporated by 24 tons of fuel weekly. Now, $70 \times 7 = 490$, and $490 \div 24$ gives over 20 tons of water per ton of fuel.

Good coal by its combustion evolves about 14,000 English chemical units. Taking the latent heat of steam at 966, and sensible heat from 252° to 212° F. at 160min. the evaporation of 1 gallon of water requires 1,126 units; or, if the whole heat of the combustion were employed in evaporating water, the amount evaporated would be only $\frac{14,000}{1,126} = 12{\cdot}4$lb. of water.

But we must deduct heat taken away in the large volume of escaping gases at 172°, so that I cannot see how by this apparatus—so far as I can understand it—one ton of fuel can evaporate 20 tons of water.

I am aware that in some pieces of apparatus for distilling fresh water from salt water some such efficiency is claimed, but here the same heat is used a second or third time, the latent heat of the condensing steam being used to heat and evaporate a new lot of water, but the steam does not appear to be condensed in the Porion evaporator, and therefore its latent heat cannot be utilised.

I trust you will excuse me for this criticism of the article, but if I am wrong I will be glad to be set right, and I am right I suppose.

May I ask is the caustic soda recovered in a commercial form?

Truly yours,

Cork, June 28th, 1887. DENNY LANE.

[We are pleased to find our subscribers taking an interest in what we have written, and moreover to find such a good criticism of the evaporative power of fuel, set forth so plainly by our correspondent, Mr. Denny Lane. The statements we made are quite correct, waste esparto liquor and waste straw liquor contain a very large amount of organic matter, often 6 per cent., or in the case quoted, very nearly 30 tons. This burns, and its heat of combustion is utilised in the evaporator. In many other systems of evaporation this heat is lost, and produces besides a very bad pungent odour in the neighbourhood. The recovered ash is drawn from the furnace in the solid form, and after causticising with lime is quite equal to the original caustic soda for use in paper-making.—Ed.]

CONDY'S FLUID.

To the Editor of the Chemical Trade Journal.

Sir,—Perhaps I may be allowed to mention that I recently had occasion to determine *the quantity of potassium permanganate in an ordinary bottle of Condy's Fluid.* The amount found to be present was 55·8 grains, and the volume of liquid in the bottle was 7·6 fluid ounces.

I have every reason to believe that the sample in question was genuine, and that it had not been tampered with in any way.

Faithfully yours,

EDWY GODWIN CLAYTON, F.C.S., F.I.C.

June 29th, 1887.

Notes and Queries.

Paraffin.—It is stated that negotiations are in progress for reducing the severity of the competition between Scotch and German paraffin works, which has been very disastrous to all concerned. We do not anticipate any practical result.

Glass Manufacture in Germany.—From Minden a correspondent writes that the glassworks in that district are well occupied, thanks to important orders from America, and it is expected that the demand will increase from the same quarter. In Dortmund, on the other hand, the manufacturers have to work for stock.

Another Chlorate of Potash Works.—It is reported that Messrs. Muspratt, Bros., and Huntley, of Flint, are about to lay down plant for the manufacture of chlorate of potash on a very large scale. The works are expected to be ready for action by the end of September.

Another Explosion at Hounslow.—Another gunpowder explosion (the third during the last few months) took place at Messrs. Curtis and Harvey's Hanworth Mills, Hounslow, at 6·15 on Tuesday morning. The cause of the explosion was a green charge, but no one was injured.

Rixon's Iron and Brick Company.—Application was made to Mr. Justice Chitty on the 28th instant for the appointment of a provisional liquidator of the Rixon's Iron and Brick Company, which carries on a large business at Wellingborough as pig-iron manufacturers and brickmakers. The petitioner is a creditor for £669. The assets of the company are £30,000, and its liability to debenture-holders £15,000. Before the petition for winding-up is heard it was alleged to be necessary to have a liquidator appointed to carry on the business, pay wages, and keep the affair a going concern. Mr. Justice Chitty appointed Mr. E. Roberts, of Leicester, provisional liquidator.

Trade at St. Helens.—Things are very quiet here. Baxter's, the Pocket Nook, and Mc.Bryde's copper works are closed, and the rest doing but very little. Chlorate of potash, caustic soda, and bleaching powder are about the only products worth making, the first is in very good demand in spite of the increased production, perhaps the Jubilee has something to do with it. A well-known firm here were talking last week of passing some of their orders here to other firms. A profit of £25 per ton upon a turn-out of 22 or 23 tons per week is not so bad in these dull times. It is understood that another well-known firm has been experimenting on the manufacture of hyposulphite of soda, but the process has, we understand, been abandoned.

The Butterine Question.—The Committee of the House of Commons on the butterine question resolved to insert in the Bill before them the word "butterine" instead of "margarine" as describing butter substitutes. Sir R. Paget's Bill will enjoin that packages containing butterine must be marked with that word in letters not less than ⅜in. square, that the article in bulk in shops shall be ticketed in letters not less than 1½in. square, and that the wrapper shall bear in letters not less than ½in. square the words "butterine, not butter." It is understood that the Committee also dealt with the Irish Bill on the same matter, the result being to remove from the measure certain proposed penal clauses that would have been very oppressive to the trade. Altogether it must be said that the traders' friends on the Committee have achieved a great and unexpected victory. When they came to divide upon the various proposals they found themselves in a majority, and if the Bills pass subject to the recommendations made they will be comparatively inoffensive. On the other hand, if they do not pass the traders at any rate will not have cause to complain.

Tobacco Burns.—We learn that several warehouses at Louisville, containing about 5,000 hogsheads of tobacco, have been destroyed by fire, the loss being estimated at $500,000.

Reduction in Wages.—It is stated that notices will be posted at the collieries in Lanarkshire intimating a reduction of wages by 7½ per cent. The change is to take place at once. This reduction is in accordance with a resolution come to by the members of the Lanarkshire Employers' Association.

Between twelve and one o'clock on Monday the 27th ult., an assistant in the shop of Messrs. Fallowfield and Co., wholesale chemists and druggists, Lower Marsh, Lambeth, was corking a bottle which contained chemicals, when he accidentally smashed the bottle, and the contents exploded. The assistant escaped without injury, but another *employé* in the shop was burned about the face and arms, and was afterwards treated at St. Thomas's Hospital. The fire in the shop was extinguished before the arrival of a manual from Waterloo Road Fire Station.

Another Fire.—A most disastrous fire broke out on Sunday, the 26th ultimo, on the Chicago Packing and Provision Company's premises. The flames spread rapidly, and buildings covering an area of over five acres were burnt to the ground. Millions of pounds of mess pork and lard were destroyed. The Armour Canning Company lost 17,000 barrels of pork and 600 hogs which could not be rescued, and perished in the burning pile. The total loss is estimated at a million and a quarter dollars.

Is Free Trade doing us any good?—A correspondent of the London *Evening News* writes as follows:—Sir, In your leading article on Fiscal Reform and Imperial Federation on June 29th you aptly refer to the productive capacity of our vast and varied Empire. Yet this "productive capacity" is the point which ordinary Englishmen utterly ignore, but which every average citizen of the American States fully recognises. In conversation with a leading New York merchant, I pointed out that the inevitable outcome of the almost prohibitive duties imposed on English manufactures would be retaliatory action on our part. His reply, summarised, was, "We do not care for that; we are pleased to take your money, but presume you would not part with same but for value received. When you discontinue dealing with us the United States of America are still self-supporting, for there is no known product of the globe that cannot be produced within the limits of those States." "But," I answered, amazed at what I considered the sublime selfishness of this asseriont, "Will not these remarks apply in every point to Great Britain and her Colonies?" "I guess they may," said he, "but if you Britishers cannot see your own interests, you must suffer for your own short-sightedness." Leaving my readers to extract the moral (if any) from this "o'er true tale,"—I am, etc., Englishman.

The Natural Portland Cement Company.— This company is formed for the purpose of acquiring, as a going concern, the Barrington Natural Portland Cement Works, which comprise all the necessary machinery, plant, &c., for the production of cement, together with the Barrington freehold estate and natural Portland Cement deposits, near Cambridge, comprising 230 acres of freehold land or thereabouts. Immediately beneath the natural cement deposit, over an extent of some 20 acres, is a very valuable layer of coprolite of excellent quality, and throughout the whole property is a bed of brick earth of great depth, from which the vendors manufacture bricks and tiles of the finest quality. The ordinary cost of manufacturing Portland cement of good quality cannot be estimated at less than 18s. per ton, whereas this company, owing to the special facilities afforded by the deposit of natural cement, which is of uniform quality and requires no mixing or manipulation before it is put into the kilns, can manufacture at 9s. per ton, or at half the cost of the usual system, while the deposit is practically inexhaustible. In addition to the foregoing the directors propose to further develop the lime, brick, tile, and terra-cotta trades, and considerable profit is anticipated therefrom; the directors, however, look to the cement deposits for the greater portion of the profits.

A. Guinness and Co. Limited.—A Dublin correspondent avers that he is in a position to state on the most undoubtedly reliable information, that the net earnings of the above concern for the nine months ending the 30th inst., or since it was converted into a public limited liability company, as from October 30th, 1886, will exceed the most sanguine legitimate expectations, amounting to £600,000 sterling.

Strike in the Oil Works.—The workmen at Broxburn and Uphall Oil Works have resolved to come out on strike in consequence of the reduction of wages announced by the masters.

The Soda Industry in Russia.—The largest soda works in Russia are those of Messrs. Y. Lubimoff and Co., in the Ural district, near Solikamsk, where the ammonia process, for which they have bought the rights from M. Solvay, is exclusively used. These works have turned out annually about 11,300 tons of caustic soda; but, having been recently enlarged, an output of 24,200 tons is expected for this year. The same firm have bought a site at Ekaterinoslay, where they propose to erect a second establishment, to turn out about 16,000 tons of caustic soda per year, also by the ammonia process, so that they will be able to put 40,000 tons of soda annually upon the Russian market.

Technical Education.—A great meeting was held in London on July 1st to further the scheme for the establishment of a National Association for the Promotion of Technical Education. The Marquis of Hartington presided, and was supported by many of the leaders of the higher education movement. His Lordship said he did not think it would be difficult to arouse any amount of public interest on this subject. If we were passive in this matter it was conceivable not only that foreign nations would rival us, but that they might also succeed in passing us, with a consequence which it would be difficult for us to contemplate. We already had a vast educational machinery, a large amount of scientific knowledge, and a still larger technical knowledge of industry and commerce; but while we had not to call these things into existence, it was necessary to combine them and supplement them, and to organise them into a system which would aid our trade and manufactures. It might be necessary at some future time that legislative proposals should be made to assist the public sympathy, but they would be slow to do anything which would impair that reliance upon voluntary effort, private munificence, and local exertion to which so much was owing. A resolution in favour of the formation of the association was moved by Sir Lyon Playfair, who said it was the desire of the association to show localities how best they could adapt their schools to their particular wants, and to show the individual how his intellect could be trained to enable him to take part in the work he had to perform. Mr. John Morley, M.P., seconded the motion, and said that England was not doing so much for the labouring classes as were other countries. The resolution was passed. Mr. Mundella and Lord Rosebery also addressed the meeting, the latter specially drawing attention to German rivalry with England in Eastern countries.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday Morning.

With the exception perhaps of soda crystals, which inquirers still find with a fractional leaning in favour of sellers, the leading articles are either stationary or incline to the fall, although without marked break of price in any case. The demand is far from strong, and if the various works in and around Glasgow are just now on slightly brisker production, this is solely in view of the approaching stoppage of from a week to ten days for the annual holidays, which commence after middle of next week. Sulphate of ammonia holds recent gains, but Scotch shale distillers' wholesale amalgamation scheme having fallen through, the upward tendency is meanwhile weakened, and only a moderate forward business is on report. Prices are as follows:—Soda crystals, 43s. to 45s. 6d. net Tyne; lump alum, £4. 17s. 6d., less 2½ °/₀ Glasgow; borax, English refined, £31 to £32, and boracic acid £46 net Glasgow; soda-ash 1d., less 12½ °/₀ Tyne (slightly

firmer); caustic soda, white, 76°, £9. 10s., 70/72° £7. 15s., and cream, 60/62° £6. 8s. 9d, less 2½ °/. Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 10s., and 1 cwt. casks, £5. 15s. net Tyne; refined alkali, 48/52°, 1⅛d. less 4 °/. Tyne; salt-cake, delivered Glasgow and West of Scotland, 30s. to 32s 6d., or 23s. 6d. to 24s. 6d. at works; bleaching powder, variously quoted as before; chlorate of potash 6 1/16d. less 5 °/. Sulphate of ammonia, good grey, stands at from £12. 7s. 6d. to £12. 15s. f.o.b. Leith, and other paraffin varieties (except paraffin spirit, which is stronger at 6¼d. forward for best makes) are feeble and unsettled in the fading prospect as regards combination on the part of the Mineral Oil Companies,—scale nominally at 1⅝d. to 1¾d. per lb., and wax, semi-refined 120°, 2½d. to 2¾d., while in mineral lubricators late prices (£5 to £5. 10s. for good ·890 oil) are well maintained. The bichrome works of Glasgow and Ayrshire alike are booking pretty freely now at the late rise, which seems to have been made good for the time The demand is largely for outside consumption. The Glasgow meeting of the Gas Institute, brought to a close on Friday, was a success. Some suggestive papers on chemical subjects were read.

THE TAR PRODUCTS MARKET.

The benzol market is fairly firm, and the average price of 90's is at the present moment 3s. 5d. per gallon, while that of 50's is 2s. 7d. The prices offered for tar by the distillers leads one to suppose that they consider these prices of products to be lasting. We know of one distiller who has purchased tar at a cost of £1 per ton in his works, which is the highest we have heard of lately. Carbolic acid is in good request, and creosote has been moving off rapidly. Anthracene is also very firm, and 1s. 3d. has been paid for A quality, 11d. for B. About this time last year there was reported to be more than 300 tons in stock, but this has now all disappeared, and new parcels are eagerly bought up. Pitch is still a drug, about 13s. 6d. is the price to-day, f.o.b. port of shipment, but, of course, only hard pitch can be shipped this weather, and so that is no criterion of what the value of medium soft would be.

THE SULPHATE OF AMMONIA MARKET.

Sulphate has been dull at Hull during the past week, and £12. 10s. may be taken as the average price, although it has been stated that higher prices have been paid for urgent requirements. From London Leith has been reported weaker, but from Leith itself the market is reported firm at £12. 10s. to £12. 15s. Beckton price is still £12. 15s., but the consumers and dealers are holding back and endeavouring to bring about a fall in values if they can, but we believe they will not be successful as stocks are so scarce.

THE PATENT LIST.

8977. Ferdinand Bosshardt. Improvements in roller mills for cutting and breaking vegetable substances. June 24.

8986. Walter W. Davenport. New or improved apparatus for automatically regulating the temperature for fermenting liquids, applicable for other similar uses. June 24.

8999. William Horsfall. A new or improved construction of furnace for burning town's or other refuse. June 24.

9015. Henry H. Lake. Improvements in atomisers. (Complete specification.) June 24.

9017. William Cross. An improved method of heating ores and other substances by an *electric current* for effecting *metallurgical, chemical, and other operations, and furnaces and apparatus therefor.* June 24.

9023. Arthur McDougall. Improvements in machinery for rendering sea-water fit to drink. June 25.

9026. James Alfred B. Bennett and William Sunderland. Improvements in the mode of manufacturing aluminium chloride. June 25.

9027. William Crowther and John Crowther. Mordanting or fixing mordants upon worsted or woollen fibres, and upon mixed fibres of wool, cotton, silk, jute, &c. June 25.

9040. Benjamin C. Badham. Certain improvements in and apparatus for purifying gases arising from sewers, surfaces, water drains, closets, and other places. June 25.

9047. Oscar Brünler and Carl Gustav Rommenhöller. Improvements in pressure-reducing valves for highly compressed gases, and especially for carbonic acid. (Complete specification.) June 25.

9064. John Orchard. Improvements in the construction of valves for gases under high pressure. June 25.

9073. William H. Gilruth. A new or improved pump or apparatus for forcing or exhausting air or gases for ventilating or other purposes. June 25.

9084. John Warburton. Obviating and preventing the escape of noxious gases from sewers, drains, and water-closets. June 27.

9085. Thomas Peat and John Graham. Apparatus for solidifying the packing of granulated, flaky, and other analogous substances. June 27.

9088. Vinian Procter. The utilisation of curriers' shavings and waste leather by the use of chemical and mechanical appliances, to be used for insoles, &c., in boots, &c. June 27.

9093. James Alfred B. Bennett and William Sunderland. Improvements in the methods of mixing metals of lower boiling points with other metals or alloys, or compounds boiling or volatilising at higher temperatures. June 27.

9102. Frank W. Dick and John McLeownan Mc. Murtrie. Improvements in apparatus for pumping and compressing fluids and for regulating fluid pressures. June 27.

9103. James Yate Johnson. An improved process for electro-plating with tin, zinc, and lead. June 27.

9126. John Edmonds. An automatic mica stage for use with the micro-polariscope as an accessory to the microscope. June 27.

9188. Emil Hänisch and Max Schröder. An improved process and apparatus for the production of sulphuric anhydride. (Complete specification.) June 28.

9194. John Imray. Manufacture of azoic colouring matters, shading from yellow to orange and from red to violet. June 28.

9199. Alfred Julius Boult. Improvements in apparatus for cooling or heating liquids, gases, vapours, and the like. June 28.

9205. Richard H. Davies. Improvements in packing granular or pulverulent substances in casks and the like receptacles, and in apparatus therefor. June 28.

9227. Charles Wigg. Improvements in the manufacture of bicarbonate of soda, and in apparatus therefor. June 29.

9257. John Imray. Manufacture of new azoic colouring matters. June 29.

9268. Frank A. Smith. Improvements in apparatus for the production of artificial cold and for the manufacture of ice. June 29.

9308. James T. Stapelton. Improvements in bed millstones for grinding cements, coprolites, and other hard substances. June 30.

9313. Andrew Mann. Improvements in alloys of aluminium with other metals. June 30.

9315. John Imray. Manufacture of yellow, orange, and red azoic colouring matters. June 30.

CURRENT.

[illegible] Portland Street, Manchester.

[illegible] of shipment in U.K. The prices in different [illegible]

	£	s.	d.
Magnesium, Hydrate ... ... per cwt.	0	10	0
,, Sulphate (Epsom Salts) .. per ton	2	10	0
Manganese Sulphate ... . ,,	19	10	0
,, Borate .. .. per cwt.	2	5	0
,, Ore, 70 ... ... per ton	2	10	0
Methylated Spirit, 60 o.p. ... ... per gallon	0	2	4
OILS: Castor ... . per cwt.	1	4	6
Cocoa nut .. .. per ton	26	0	0
Cotton seed . ... ,,	21	10	0
Colza .. .. per ton	25	0	0
Linseed .. .. ,,	21	15	0
Lubricating, Scotch, 885°—890° ... ,,	5	17	6
Oleine .. .. ,,	18	0	0
Palm ... ... ,,	19	15	0
Petroleum (refined for burning) Russian per gal	0	0	5½
,, ,, American ,,	0	0	5⅝
Rape ... . per ton	24	0	0
Rosin .. .. ,,	10	10	0
Sperm .. .. per cwt.	2	15	0
Whale . . .. ,,	1	0	0
Silver (metal) . . .. per oz.	0	3	7⅞
,, Nitrate . ... ,,	0	2	8
STARCHES:			
Sago .. . . per cwt.	0	8	9
Potato (farina) ... . ,,	0	10	3
Rice ... . ,,			
Sodium (metal) ... . per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 % per ton	5	10	0
,, ,, (Caustic Soda-ash) 48 ,,	4	0	0
,, ,, (Carb. Soda-ash) 48 % ,,	4	2	6
,, ,, (Soda Crystals) ... ... ,,	2	10	0
,, ,, (Crystal Carbonate) ... ,,	5	6	3
,, Chlorate ... ... per lb.	0	0	7½
,, Borate (Borax) .. .. per cwt.	1	10	0
,, Bichromate .. .. per lb.	0	0	3½
,, Hydrate (74 % Caustic Soda)... per ton	8	7	6
,, ,, (70 % Caustic Soda) .. ,,	7	12	6
,, ,, (60 % Caustic Soda, white) ,,	6	12	6
,, ,, (60 % Caustic Soda, cream) ,,	6	7	6
,, Bicarbonate ... ... ,,	6	5	0
,, Hyposulphite ... ... ,,	5	5	0
,, Nitrate (95 %) ex ship Liverpool per cwt.	0	8	9
,, Silicate (glass) ... ... per ton	5	10	0
,, ,, (liquid, 140° Tw.)... ... ,,	5	2	6
,, Sulphate (Salt-cake) .. .. ,,	1	4	0
,, ,, (Glauber's Salts) ... ,,	2	2	6
,, Sulphite ... ... ,,	5	17	6
Potassium (metal) ... ... per oz.	0	3	10
,, Bichromate ... ... per lb.	0	0	4½
,, Carbonate, 90 % ... ... per cwt.	0	19	0
,, Chlorate ... ... per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ... per ton	23	10	0
,, Nitrate (refined) ... ... per cwt.	1	2	0
,, Prussiate Yellow ... ... per lb.	0	0	7½
,, Sulphate, 90 % ... ... per ton	11	10	0
,, Muriate, 80 % ... ... per ton	9	5	0
Strontium Hydrate, 40 % ... ... per cwt.	10	0	0
Sugar, Beet .. .. per cwt.	0	13	3
,, Cane ... ... ,,	0	14	6
[illegible]ulphur (Flowers) ... ... per ton	9	5	0
(Roll Brimstone) ... ... ,,	5	17	6
[illegible]hosphate of Lime (28 %) ... ... ,,	1	17	6
[illegible] ... ... ,,	21	15	0
[illegible]al) ... ... ,,	103	0	0
[illegible]als ... ... per lb.	0	0	7
[illegible]er) ... ... per ton	14	10	0
[illegible]le (solution 96° Tw.) ... ... ,,	5	15	0

SATURDAY, JULY 16, 1887.

HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

age 33 we had followed the development of manganese y processes up to the year 1866. We have also seen *us operandi* by means of which chlorine was manu- l at that time, this bringing us to March 1st, 1866, Walter Weldon took out letters patent for improvements anufacture of soda from common salt. This process bly well known to the trade as the fluoride of sodium which brought him into communication with that turer who was destined to aid in bringing the ese recovery process to perfection. At this time we on good authority that the patentee was not proficient ical chemical knowledge and Mr. Gamble pronounced the fluoride process, but mentioned to Mr. Weldon would confer a benefit on the trade if he could perfect ess of manganese recovery; this no doubt caused Mr. to look more carefully into the subject, and as he l acquainted with the literature of chemistry, better than any living man, it is not surprising that his f July 26th, 1866, for improvement in the manufacture ine was taken out. In this patent the oxidation of oxide of manganese was accomplished by blowing ugh water or other liquid holding the protoxide in re or suspension. Taking the still liquor, this was by any well known method to get rid of the iron, the le of manganese was then thrown down by lime or magnesia, the mixture put into a vessel having a ed false bottom, and air injected by means of a engine. The specification also contains details of s been called the magnesia process, but we do not at present to touch upon this point. Such were ldon's claims, and from what we have already pub- ere was nothing new or novel in any of his proposals, ess has however after many years proved a commer- cess, and it was only due to the want of chemical ing knowledge on the part of the chlorine manufac- f those days which prevented it being a success when roduced by Mr. Gossage. The specification of Mr. of 1866 does not tell us any more than Gossage's tion of 1837, and a perusal of the list of patents these two dates ought to have shown a good technical the principal points to be carefully watched in new plant for such a process. As it was, several egan to experiment almost simultaneously, Mr. at the Gerard's Bridge Chemical Works, Messrs. Deacon, and Co., of Widnes, and the Walker Co. on the Tyne, these were the pioneers of the ese recovery process as we now know it, and between veral works Mr. Weldon used to perambulate, first g then coaxing the management in order to get his rried out.

y not be known to every one that the early difficulties— ete oxidation, bad settling mud, and those faults now r heard of were at first prevalent owing to reactions discovered; a reddish brown mud was more often r of the day, which we believe was then generally l to be a hydrated sesquioxide. On the Tyne, the ents which were being conducted at Walker were on t of being given up, as they were of opinion that the of so much air through a mixture of lime and ese would fix such an amount of carbonic acid from osphere as to render the mud unfit for use as a producing agent, and it was only when Mr. Weldon to St. Helens after a visit to Newcastle that Mr. ll, then the engineer and manager for Mr. Gamble, the fallacy of those arguments. Messrs. Gaskell, and Co., of Widnes, were also carrying out experi- n similar lines, and they attempted to oxidise the le of manganese by injecting air through the mixture Korting jet. We *believe they had also found* it impossible to produce a black mud when working strictly to the description of the process given in the specification of July 26th, 1866. In fact, this firm had tried so many experiments that they were not favourable at the moment to continuing them. Manganese was becoming more and more scarce every day, the price was rising, and several manufacturers began to see that something would have to be done to keep prices down, so Mr. Gamble, aided by Mr. Bramwell his manager, and by Mr. Weldon himself, still kept plodding on in the work they had undertaken, as they clearly foresaw that the process was perfect on chemical grounds, the engineering only being at fault. We believe that up to the year 1870 manganese mud had not been recovered on any considerable scale for the manufacture of commercial bleaching powder, and even in 1871, when it was working at the factory of Messrs. Hall and Shaw at Widnes, many of the bleaching powder makers of that day expressed themselves not satisfied with the process as they saw it, and hesitated to go in for the new process until it had been tried elsewhere. This process introduced a great innovation: hitherto it had been the custom almost universally to employ the manganese in a solid form; under this system of recovery the mud was allowed to settle, so that as much as possible of the clear fluid could be decanted, thus leaving the consolidated mud at the bottom of the settling vessel. This, at first militated against its introduction, as manufacturers by the old process knowing the importance of the use of strong acid did not care to commit themselves to a process whereby the acid was considerably weakened with the water of the mud until at least they had had the opportunity of watching the process in actual work for some time. Most of the older inventors who had essayed to recover manganese from waste liquors had aimed at producing it in the solid form; but it was to overcome the expense of such an operation that its use in the form of mud was attempted. Many were the attempts and different were the means employed in the earlier experiments to effect the objects the inventors had in view. Some of the earlier trials were made in the stills themselves, where lime was added in the solid form to precipitate the manganese, the air supply being introduced through the lid or cover of the still by means of a telescopic tube. Before this, certainly in the alkali trade there had been no perfect continuous process, and the lesson had not been learnt that the impurities in any manufacturing process are the substances to be most looked after, and their accumulation to be guarded against. It is not therefore surprising that the operation of blowing in the stills proved to be impracticable, and therefore the liquors themselves would have to be treated by a separate process to partially purify them ere they could be used for continuous recovery. The early experiments with this process, as carried on at all events at St. Helens, were so bound up with the magnesia process that it was some time before the ordinary lime process as now carried out was got well under weigh, some years were spent in fruitless experiments which cost Mr. Gamble large sums of money, and up to this point at least—after two years of experimentation—the process was still in embryo, the discovery not having yet been made which was necessary to make the process a commercial or even a technical success.

(To be continued.)

POLLUTION OF THE EAGLEY BROOK NEAR BOLTON.

THE further hearing of this case was resumed before Mr. Justice Kay, on Tuesday, the 5th inst.

Mr. George E. Davis further deposed that he had calculated from Mr. Collins' and Mr. Estcourt's figures that the defendants were sending into the Eagley Brook from 200 to 300lb. of solid matter daily, while at the plaintiffs' intake, by the figures of the same witnesses, the river, calculated for a flow of 26,000,000 gallons per diem could not contain less than 60 tons in the same time. The witness stated that he had walked up the river from Turner's bridge to the Belmont works, taking samples on the way at various points, and he

OUR PR[illegible]

PREPARED BY HIGGINBOTTOM [illegible]

The values stated are F.O.R. *at works* [illegible]

ACIDS:

,, Acetic, 25	... ...	per cwt.
,, Arsenic...	... ...	,,
,, Chromic	... ...	per lb.
,, Fluoric	... ...	,,
,, Muriatic (Tower salts) 30 Tw.,		per bottle
,, ,, (cylinder) 30 Tw.	...	,,
,, Nitric, 80 Tw.	... ...	per lb.
,, Nitrous...	... ...	,,
,, Oxalic	... ...	,,
,, Sulphuric (fuming	) ...	,,
,, ,, (Brimstone 168)	...	per ton
,, ,, (Pyrites 168)	...	,,
,, ,, (spent oxide 168)	...	,,
,, ,, (,, 150)	...	,,
,, ,, (Pyrites 150)	...	,,
,, Tartaric	... ...	per lb.
Alum...	... ...	per ton
Ammonia, ·880 28°	... ...	per lb.
,, = 24°	... ...	,,
,, Carbonate	... ...	,,
,, Muriate	... ...	per cwt.
,, ,, (sal-ammoniac)	...	,,
,, Sulphate (grey), London	...	per ton
,, ,, (grey), Hull	...	,,
Aniline Oil	... ...	per lb.
,, Salt	... ...	,,
Antimony...	... ...	per lb.
,, (tartar emetic)	... ...	per lb.
Barium Chloride	... ...	per ton
,, Carbonate (native)	... ...	,,
,, Sulphate (native levigated)	...	
Bleaching Powder, 35 %	... ...	
,, Liquor, 7 %	... ...	
Bisulphide of Carbon	... ...	

COAL-TAR DYES:—

Alizarine (artificial) 20%	... ...
Magenta	... ...

COAL-TAR PRODUCTS:—

Anthracene, 30 % f.o.b. Goole,	per unit
Benzol, 90 %	,,
,, 50 %	,,
Carbolic Acid (crystallised 35°)	...
,, (crude 60°)	...
Creosote (ordinary)...	... ...
,, (filtered for Lucigen light)	
Crude Naphtha, 30 % @ 120° C.	
Grease Oils, 22° Tw.	... ...
Pitch, f.o.b. Liverpool or Garston	
Coke-oven Oils (crude)	...
,, (distilled)	...
Copper (Chili bars)	... ...
,, Sulphate	... ...
,, Oxide (copper scales)	
[illegible]	... ...
[illegible] (crude)	... ...
(refined)	... ...
[illegible]	... ...
[illegible] (blue billy)	...
,, (bag; white)	...
,, (precipitated)	...
[illegible] (copperas)	...
[illegible] (burnt pyrites)	
[illegible]	...
[illegible]	
[illegible]	

[illegible] could not possibly affect the w[illegible] [illegible]er Eden and Thwaites.

[illegible] witness, iron was the most i[illegible] [illegible]; he found 0·3 grain per gallon [illegible] [illegible]ned in the water from Eagley Brook [illegible]as. Turner and Co.'s effluent; 0·5 gr[illegible] [illegible]ton weir; 0·4 grain per gallon fifty [illegible] mills, the water entering Dunscar [illegible]ned 0·4 grain per gallon, while Chadw[illegible] [illegible] contained 22·3 grains of iron and alum [illegible]ch 1·8 grains was in suspension. At [illegible]ok contained 0·7 grain of iron and alum.

[illegible]ess finally stated that supposing there to [illegible]es of iron on the stream, the quantity pr[illegible] [illegible]ment trough could not possibly have any e[illegible] [illegible]g by the time it arrived at Blair and Sumner's [illegible]rover it would be impossible to detect such [illegible] of iron by chemical analyses in the water u[illegible] [illegible]centrated by evaporation.

[illegible]EMICAL EXHIBITS AT THE MANCHE[illegible] EXHIBITION.

VII. DESTRUCTIVE DISTILLATION.

[illegible] announced on page 52 we now proceed to desc[illegible] [illegible]ts coming under the head of Destructive disti[illegible] [illegible] of the 25 exhibits catalogued by the committee un[illegible] [illegible]ead, we can only find four as strictly coming un[illegible] [illegible]omination. The wood distillation industry, w[illegible] [illegible]ly well represented in the Manchester district, is [illegible] exhibition conspicuous by its absence—perhaps it is [illegible] it is considered by some as a secret process that we [illegible] it amongst the show cases, anyhow it is not there.

There are three distinct processes of destructive dis[illegible] which ought to have found places in this section. [illegible] destructive distillation of coal as usually carried o[illegible] ordinary gasworks; 2nd, The destructive distillation [illegible] in beehive ovens when coke is the principal product re[illegible] and 3rd, The distructive distillation of shale as carrie[illegible] the Scotch oilworks.

Under the first head Messrs. Hardman and Co., o[illegible] Platting, exhibit a very interesting collection of [illegible] products obtained in the manufacture of coal-gas, a[illegible] information thus given is greatly enhanced by the [illegible] showing the quantity of the various products obtaine[illegible] half-a-ton of coal. These may be seen in Stand 74[illegible] have already noticed the very beautiful model of a s[illegible] and tar works exhibited by this firm, and we call the at[illegible] of the gasworks proper to it. In many places the inha[illegible] are much annoyed by the process of removal of the [illegible] liquor from the gasworks, while it is worthy of note [illegible] gasworks might, without any fear of causing a nuisance [illegible] up all their residual products without having to pur[illegible] single thing from the outside. Leicester, Nottin[illegible] Rochdale, Hull, and several other towns are proofs [illegible] statement, and it is a very wonderful thing that this [illegible] of working has not been more often followed.

Destructive distillation of coal is also practised exte[illegible] in the Otto and Carvès coke ovens, from which o[illegible] coal-gas, good coke, and the usual tar and liquor is ob[illegible] At Stand 718 (not, however, in this section) Mr. H. [illegible] exhibits a model of the Simon-Carvès coke ovens wit[illegible] of the bye-products obtained from them. The introd[illegible] of these ovens has not been extensive. The recov[illegible] bye-products from the distillation of coal is now looke[illegible] as too fickle an operation for most capitalists, and c[illegible] with the fact that there is a very strong prejudice i[illegible] against the look of the coke, we fear this operatic[illegible] received such a blow it will not be able to recover fro[illegible] some years. There has been much money lost durir[illegible] past five years in the attempt to win tar and ammonia [illegible]ke-oven gases, and so far as we can learn it has only [illegible] makers in Westphalia who were wont in times go[illegible] [illegible]ake their small coal into patent fuel.

[illegible] 27 Mr. George E. Davis exhibits specimens of [illegible], and xylene, 90 % benzol, and solvent [illegible] by the destructive distillation of coal for [illegible] the products merely, the gas being looked upon [illegible], and dealt with accordingly. Large works for [illegible] carrying out of this process were erected near [illegible] 1884, of a capacity to distill 16,000 tons of coal [illegible] In this process coal-gas, properly made and [illegible] in the ordinary way, is cooled down to 4° C., and [illegible] with oil which has also been cooled to the same [illegible]; the benzol from the gas dissolves in the oil, [illegible] a 10 % solution from which it is displaced, the oil [illegible] over and over again for fresh absorptions. The [illegible] amounting to about 12 pounds per ton of coal, is [illegible] from the gas by absorption in oxide of iron, and [illegible] taken away as made by a vitriol maker, who returns [illegible] of vitriol for the manufacture of sulphate of ammonia. [illegible] amount of sulphate of ammonia is about 30 lb. per ton [illegible] coal, but, of course, this will vary with different classes of [illegible]. The tar amounts to from 15 to 17 gallons per ton of [illegible].

Although the process is successful from a technical and [illegible]ineering point of view, benzol cannot be made as a [illegible]ative article at the price it is being sold to-day. The [illegible] source of benzol is gas-tar, which is always sold by [illegible] gasworks at the price people will give for it, and not at [illegible] it is worth for the articles it contains.

There is yet another phase of destructive distillation which [illegible] not brought prominently forward in this section, and that [illegible] coking of coal in the ordinary beehive ovens, in which [illegible] gases and vapours, at one time sent into the air, are now [illegible]vered. This is done in several instances by Jamieson, Aitken, and others, and as it produces substances quite [illegible] from the Otto or Carvés ovens, there was every reason why the process should have been well illustrated. Similar products have been obtained from the blast furnaces [illegible] Gartsherrie, and may be found in Case 781, a veritable *vile putrida*, the select exhibit of the Committee of Section III. The committee, we believe, consigned several cases to the lower room on account of their miscellaneous character, and why Exhibit 781 should have not been put beside them [illegible] the same reason no sensible man can tell.

We now come to the distillation of shale as practised in Scotland. Here the coal shale is distilled in retorts of various pattern, at a low temperature, so that as little permanent gas as possible is developed. Oil and ammoniacal liquor is produced, the latter of which is worked up into sulphate of ammonia, while the former is the starting point of a very large and important industry, as from it is made burning oil, lubricating oil, and paraffin, three very important articles of Scottish industry.

The exhibits to illustrate the shale oil industry have been very tastefully got up. The Dee Oil Company, of Saltney, near Chester, show lubricating oils, wax candles, and paraffin wax, together with sundry other products, while the Linlithgow Oil Company Limited exhibit samples of the products from the crude mineral oil through most of its stages until burning oil, lubricating oil, naphtha, and paraffin have been extracted. Specimens of hard paraffin scale, melting point 118°–120°, and of soft scale, having a melting point of 90°–95°, are also shown as examples of the different stages in the manufacture of refined paraffin.

But it is to the Broxburn Oil Company Limited that we must give the palm for an artistic and at the same time an educational exhibit. The Case 750 which they have placed in this section gives every one an idea of the immense importance of this industry, and of the many uses to which shale oil products may be put. We find in this case a specimen of the raw shale, a sample of the spent shale from the retorts, and the residue after it has been used as fuel, so that nothing is wasted of the organic constituents of the shale. Burning oil, lubricating oil, gas oil, paraffin scale, paraffin wax, candles, &c., complete the list of articles; the models in wax of various kinds of fruit show how many are the uses of this important article.

The trade, however, *like most other branches of chemicals*, is now under a cloud; the coming deluge of petroleum from both East and West will assuredly produce a most serious effect upon this, the greatest of Scottish industries. In an article on page 27 we have already pointed out the seriousness of the change which is taking place. A small percentage reduction in the wages of the workmen will not meet the difficulty, and it remains to be seen what will be the upshot of it all.

(To be continued.)

THE TWENTY-THIRD ALKALI ACT REPORT.

II. CHEMICAL MANURE WORKS.

THE Chief Inspector seems to have had the same difficulty with manure works as had the late inspector, Dr. Angus Smith, for the Act of 1881 does not sufficiently distinguish what are chemical manure works and what are not. In former times the owners of manure works were simply manufacturers of superphosphate, which they use to mix with various nitrogenous matters such as sulphate of ammonia or or nitrate of soda as required. By and bye great changes were made, and the bad meat, fish, blood, animal offal, and other waste substances were brought in as a source of nitrogen; the gases evolved under the old regime were purely inorganic elements, while now it is not uncommon to find organic odours as the source of evil.

In former times the smells escaping from manure works, though not very pungent, did some damage to the vegetation of the surrounding neighbourhood, and it was on this score that they were included in the last Act of Parliament. The gases escaping from the mixing apparatus consisted mainly of fluoride of silicon, and the decomposition of this gas gave rise to products of a destructive nature. When animal matters began to be used the nature of the gases evolved suffered a change; as may be imagined, the flesh which is made into manure is not always of the freshest description, especially in summer. When this is boiled in large quantities the odour of the escaping steam has by no means a pleasant smell, and is much complained off by residents in the vicinity. The smell from the cooking of an ordinary dinner is often by no means pleasant to the nose; how much more unpleasant must be the cooking of several tons of semi-putrid flesh in one operation.

It is between these two classes of smells that the Chief Inspector has to draw the line. Some people are of opinion that both of them should be looked after by the inspectors, but the Act does not make this clear. The Act was originally put in force to suppress inorganic vapours, and the Chief Inspector is perfectly right when he attempts to suppress the fluosilicic acid and neglects these organic odours, which in such infinitesimal quantities make life almost unbearable in the vicinity of these flesh-boiling establishments. The public will not suffer by such an arrangement if the local authorities will do their duty, the acids will be kept under control by the inspectors of Alkali, &c., Works Act, while it is clearly the duty of the local authorities to suppress the nauseating odours for which the Public Health Act was partly devised. It is now many years since that apparatus was figured in the annual blue-book for the suppression of noxious gases from manure works, some of which were never likely to effect the object in a satisfactory manner, and have been consigned to oblivion. It is a notorious fact that most appliances which have been figured in the Chief Inspector's report in years gone by have never been practical or lasting, and if one wants an illustration of "how not to do it," we have only to consult the well known blue-book.

So far as we have read the Acts of Parliament relating to this special subject, the inspectors were never appointed to act as consulting chemists to the works they visited; they were bound to inspect only, and we say most decidedly that much of the present depression in the chemical trade has been caused by the gratuitous dissemination of processes and appliances, and which has kept ignorant and unfit persons upon their legs when they ought to have succumbed to the law of the survival of the fittest.

THE SALT TRADE.

The month of June, though in some points very satisfactory, has not been up to the mark of a few years ago. June, 1886, was an improvement on June, 1885, but June, 1887, has not quite reached June, 1886. The diminution is entirely in the Liverpool market, the Upper Mersey ports being very satisfactory. The June shipments of white salt for the past ten years have been:—

	Tons.		Tons.
1878	89,581	1883	108,955
1879	106,721	1884	107,597
1880	131,316	1885	96,898
1881	115,812	1886	103,607
1882	105,198	1887	100,776

The average for the ten years is 106,646 tons; for the first five years 109,725 tons; for the last five 103,766. We have another proof here of the diminishing shipments. June, 1887, is less than any of the averages. Looking at the six months just completed, we are pleased to note a considerable increase on the first six months of 1886, amounting to no less than 71,967 tons. This increase has been caused to a large extent by the better shipment of East Indian salt, there being an increase of no less than 61,150 tons during the six months. The total shipments of the first six months of 1887 are just slightly in excess of those in the same period of 1885; but still less than the six previous years. The shipments of white salt for the first six months of the past ten years have been as follows:—

	Tons.		Tons.
1878	424,535	1883	523,277
1879	476,106	1884	504,829
1880	561,160	1885	467,342
1881	539,042	1886	398,767
1882	503,157	1887	470,734

The average for the 10 years is 486,894 tons; for the first five years 500,840; for the last five 472,990. Thus the shipments of the present year are below all these averages, again showing that the white salt export trade is on the decline. Unfortunately, the decline in salt exports does not show the whole decrease, for the shipments by rail, river, and canal to alkali works have decreased in even a larger ratio than the exports. It is possible that in the course of a few years the growing demands of the markets we now supply may make up the deficiency; but at present the prospect is not very brilliant.

The shipments to the United States North are again low, and the decrease on the six months as compared with 1886 is no less than 21,038 tons. The same causes that have been operating so long still continue.

To British North America 4,500 tons less salt has gone than in June, 1886; but during the first six months of 1887 there have been sent 44,644 tons, as against 43,236 in the corresponding period of 1886.

To the Southern United States more salt has gone than usual at this season, but most of it was for the Western States by another more favourable route.

The West Indies, South America, and Africa have all had a small month of shipments.

The giant market of the month, and to which four tons out of every seven shipped at Liverpool, and four out of every ten shipped at all the Mersey ports to all parts of the world, has been the East Indies. No less than 40,358 tons have been sent in June. The shipments to this market during the six months have reached 172,111 tons, as against 110,961 in the corresponding period of last year, showing an increase of 61,150 t[illegible] e take the shipments of the first six months of e[illegible] past six years, we find them stand thus:—

		Tons.
1882	[illegible]e	138,929
1883	[illegible]	110,961
1884	[illegible]	172,111

[illegible] be seen th[illegible] f these, and fully the best av[illegible]

The Australian shipments are a fair average in both [illegible] and rock salt.

Germany has taken but little salt in June, and [illegible] shows a considerable diminution on June, 1886, and [illegible] six months there is also a decrease. In 1886 the shi[illegible] for six months were 9,092 tons; this year, 7,418. [illegible] seems no prospect of any change in the Russian [illegible] favour foreign salt.

The Danish and Scandinavian shipments have be[illegible] though not large.

Belgium does not seem to improve in either white [illegible] rock salt; in fact, in the latter the trade seems rapidly [illegible] out.

The coastwise shipments have been satisfactory, and [illegible] shipment of fishery salt to Scotland has been made.

The shipments of rock salt, especially to Holland a[illegible] home ports, have been fairly good.

The Upper Mersey ports have had a good month.

We can say no more about prices than we have [illegible] some months past. They are thoroughly unsatisfac[illegible] common, fair in fishery, and fair but decreasing i[illegible] Indian salt. There is nothing further to report [illegible] moment.

Subsidences go on, and at length Jones' shop, the s[illegible] so many sudden sinkings, is to be abandoned.

Brine is low, and shortly we may anticipate a long [illegible] of scarcity.

SALT SHIPPED DURING JUNE, 1887.

WHITE SALT.

Destination.	From Liverpool.	From Runcorn.	From Weston Point.
	Tons.	Tons.	Tons.
United States (North)	5,836	—	—
,, ,, (South)	1,965	—	—
British North America	8,111	—	339
West Indies & Central America	112	—	—
South America	544	—	—
Africa	1,915	—	—
East Indies	40,358	—	—
Australia, New Zealand, &c.	1,520	—	—
Germany	382	—	—
Russia	1,982	—	—
Denmark and Iceland	2,150	—	130
Norway and Sweden	1,228	—	344
Belgium	565	—	179
Holland	—	—	—
France and South of Europe	21	—	—
England	—	7,153	2,496
Ireland	400	2,005	1,200
Scotland	2,656	12,058	9,127
Total	69,745	17,216	13,815

ROCK SALT.

United States (North)	615	—	—
,, ,, (South)	100	—	—
British North America	—	—	—
West Indies and Central America	—	—	—
South America	70	—	—
Africa	—	—	—
East Indies	—	—	—
Australia, New Zealand, &c.	545	—	—
Germany	—	—	—
Russia	—	—	—
Denmark and Iceland	820	—	—
Norway and Sweden	—	—	—
Belgium	620	—	62
Holland	561	—	2,606
France and South of Europe	—	—	—
England	—	1,618	816
Ireland	—	305	90
Scotland	—	145	5
Totals	3,331	2,068	3,579
Grand Totals, white and rock	73,076	19,284	17,394
Corresponding month of 1886	79,183	17,097	15,882
Increase	—	2,187	1,512
Decrease	6,107	—	—

Correspondence.

"BUTTERINE" OR "MARGARINE."

To the Editor of the Chemical Trade Journal.

Sir,—I have carefully followed the development of margarine legislation, and have spared no trouble to acquaint myself with the manner in which it is sold. There is not the least doubt that in the Bolton and Manchester districts it is either not marked at all or in such a manner that the name does not attract notice. In some cases it is marked thus—"BUTTERINE,"—so that a great injustice is done to the working classes who for this material often pay quite as much as the price of good butter. The change in the name to "margarine" will to a material extent stop the fraudulent sale of inferior butter substitutes which are now sold and are injurious to health, and it is my sincere hope that you, from sympathy with the poor, will support the retention of this name "margarine." The only injurious effect which could arise, even suppose the trade in margarine were to suffer, would be that the manufacturers would have to reduce their prices to get rid of the material, and this may be expected, as England is the only country where they find a ready market for it. Such a reduction would be a wonderful boon to our working classes, and I cannot, therefore, understand how any conscientious member of Parliament can give a vote which benefits only a few butterine makers in Holland and some dealers here, and sacrifices altogether the large population of our manufacturing towns. I am not speaking without experience, as I have been a medical man for 45 years, and for a number of years held the office of medical officer of health. Yours, &c.,

JOHNSON MARTIN.

CARBOLIC ACID.

To the Editor of the Chemical Trade Journal.

Sir,—We notice a letter signed "A. J. P." in a contemporary, in which he quotes Professor Carpenter as having stated that "carbolic acid, instead of being the effectual disinfectant it is generally supposed to be, simply tends to preserve the dormant germs from decay." This quotation is somewhat misleading, as Dr. Carpenter corrected the remarks which were originally printed, and stated that "he does recommend carbolic acid as destroying the living growing germs, but that in dilute solutions it had no destructive effects on the dormant spores." The difference is a material one, and it is well understood by scientists that spores are very difficult to destroy, as their vitality resists the action of many strong chemical solutions; but it is certain that carbolic acid prevents the development of germ life when present in the ratio of even one part in 850 of the solution to be treated.—Yours, etc.,

Manchester, July 11, 1887. F. C. CALVERT & CO.

BUTTER SUBSTITUTES.

On Wednesday, June 8th, an ordinary meeting of the members of the Society of Public Analysts was held at Burlington House, the President, Mr. A. H. Allen being in the chair. A paper by Dr. Muter, "On the American methods of manufacturing oleo-margarine, and the laws on the subject, in the United States," was taken as read.

The President then referred to the bills for dealing with butter substitutes now before the House of Commons, and stated that both he and Mr. Otto Hehner had attended the meeting of the Select Committee on two of the occasions when witnesses had been examined. Mr. Allen stated that the mixing of butter with butter substitutes was a manufacturing operation, and was rarely practised by the retailer, and he expressed the opinion that special legislation to prevent fraudulent sales was necessary, as there was no other article of an exactly parallel nature, except factitious wine. It appears that some correspondence has been going on in the *St. James' Gazette* respecting the *reference of perishable samples sent to Somerset House for analysis*, and several pages of the present number of the *Analyst* are taken up with what is really a criticism of the opinions of the Somerset House chemist.

Mr. Lovell said he had had great experience as an importer and distributor of butter substitutes. He restricted the term oleo-margarine to the manufacturer's intermediate product. He thought the sale of butterine for butter should be put a stop to. He apparently had every confidence in public analysts, and approved of Dr. Bell's suggestion that an inspector should be allowed to take, without purchase, samples of apparent butter not having a butterine label. He objected to the suppression of the word butterine. All butter substitutes sold retail should be wrapped in descriptive labels, and the word "butterine" should be branded on all kegs and cases. By inflicting sufficiently heavy fines, and even imprisonment for repeated offences, the fraudulent sale of butter substitutes would soon cease. He would apply the term butterine to everything but genuine butter.

Mr. Harland said that there are in London makers of oleo-margarine simply, and other firms who mix oleo-margarine with oil or milk and produce the article butterine. Recently he had had to examine a number of butters as they came into London. A good many brands had been warranted genuine and suspicion had arisen about them. As a matter of fact, more than 50 per cent. of them contained from 30 to 60 per cent. of butterine; they were branded or warranted genuine and had the name of a respectable trader attached.

Dr. Muter said he could confirm the president's recollection that the term oleo-margarine was originally applied to the finished product, and not limited to the intermediate article as it now is by some traders.

It will be seen that the House of Commons has not adopted the suggestion of the Select Committee, but has decided that henceforth butter substitutes shall be called "margarine." A determined attempt is, however, being made by "the trade" to reverse this decision.

Notes and Queries.

Serious Fire near Greenock.—A fire occurred near Greenock on Sunday morning, whereby the Overton Paper Mills, belonging to Brown, Stewart, and Co., were destroyed, and damage was caused to the extent of about £22,000. The workpeople left on Saturday evening for the Fair holidays, and about half-past three on Sunday morning the coach-house and oil store were found to be on fire. The buildings, notwithstanding the efforts of the fire brigade, were rapidly destroyed. The works were very extensive, covering an area of nearly thirty acres.

The Pollution of the Bridgewater Canal.—At the monthly meeting of the Sale Local Board held on Wednesday, the 6th instant, Mr. J. Fullalove presiding, the Clerk reported that the magistrates at Altrincham had dismissed the summons taken out by the Board against the Bridgewater Navigation Company, but that they had recommended the Company to give some assurance that the nuisance would be abated.

The Salford Tar and Ammoniacal Liquor Contract.—At the monthly meeting of the Salford Town Council on the 6th instant it was reported that the tenders of Messrs. J. Preston and Co., Bradford, Manchester, and Messrs. H. Lockwood and Co., Manchester, for tar, at 15s. per ton, were accepted, as was also the tender of Messrs. Hardman and Co., of Miles Platting, for ammoniacal liquor at a price to be decided by the amount of sulphate of ammonia contained in each ton.

The Dynamite Explosion in Hungary.—Appalling details of the dynamite explosion in Hungary are now becoming known. Almost all the survivors have become deaf or blind, and there are many cases of concussion of the brain. It appears that the disaster was entirely due to an accident. In lighting a fuse for the purpose of demonstration the instructor burnt his hand, and the pain made him throw away the fuse, which fell so unluckily as to cause the explosion.

The Crown Prince of Greece in Manchester.—His Royal Highness, accompanied by M. Hazzopulo, Greek Consul, and friends, paid a visit to the Exhibition, and was much interested in the chemical section, making a long pause at Messrs. Osler's beautiful crystal fountain.

Burning Oil.—Clarendon, situate in the Pennsylvania petroleum region, has been burned down, the conflagration being caused by fireworks. Some petroleum tanks exploded, and several persons were burnt to death. The entire valley was soon filled with the burning oil, and the people fled to the hills. The loss sustained amounted to $350,000.

Strike in the Oil Works.—The resolution of the oil works managers in Scotland to reduce wages all over is being resisted by the workmen, who have resolved on striking. The men at Burntisland, Uphall, and Holmes have come out, and the Pumpherston men are to follow. The Broxburn men have not yet definitely decided.

Explosion of Guncotton.—A terrific explosion of guncotton is reported at Saint Medard Powder Mills, near Bordeaux. Three men have been blown to atoms and several horribly maimed.

An Explosion at Antwerp.—A terrible explosion took place at Antwerp yesterday, wrecking a factory. Three persons badly injured have been recovered, but four corpses remain beneath the ruins.

The Manchester Exhibition.—An extraordinary state of things recently existed at the Manchester Exhibition. The vast machinery section was almost at a standstill last week for the second time, the attendants being on strike against the managing committee. The exhibitors' servants have been agitating for a reduction of the tariff charged them for food, and this being refused, and a meeting in the building dispersed by the police and some attendants' tickets cancelled, a large number have left the stands.

Cleveland Iron Prices.—The Accountant's return, giving the net average invoice prices of No. 3 Cleveland pig-iron for the quarter ending June was issued on the 6th inst. This shows that the average price was 32s. 3⅞d. per ton, being a very slight advance upon the previous three months. The wages of blast-furnacemen and ironstone miners are fixed on the sliding-scale. By this return the miners get a fractional advance, but the blast-furnacemen's rate of wages remains unaltered. The ironstone miners are dissatisfied with their sliding-scale, and lately gave notice that they would not renew it.

Closing of Oil Works.—Owing to the strike among their workmen, the Broxburn Oil Company have made arrangements for closing their works, and intimation has been sent to contractors who supply them with coal and other materials that they will not be in a position to accept delivery for some time to come.

The German Sugar Industry. — From a private circular we learn that in the sugar trade during the past month prices of cane have improved 6d. per cwt., and that of beet 9d. to 1s. 3d. per cwt. This latter advance is mainly due to a Magdeburg syndicate, who in an oversold market are requiring delivery on forward contracts. Fears of a protracted drought have also stimulated purchases. The present quotations of 88 per cent. are—spot 12s 3d., July and August (German) for delivery contracts 13s. 1½d., and new crop 12s. 3d. The continuous imports of foreign refined exercise a depressing influence on home manufacture, and it is difficult to see when these will end. It is significant, however, that out of sixteen German sugar companies whose reports appear in the *Deutsche Zucher Industrie*, only two, or at most three, declare dividends. One item of strength to the market is the paucity of stocks held by the wholesale and retail trade throughout the country as contrasted with considerable stocks at the same time last year. This fact, taken in conjunction with the absence of speculation and the unusually low prices, is important. According to Licht the increase in the consumption of Europe and North America for the twelve months ending the 31st May last, compared with the previous year, is 372,000 tons. It remains to be seen whether the consumption of the world has now over-*taken the production.*

Scottish Mineral Oil Works.—At a meeting of works and mining managers in connection with the mineral oil trade, held in Edinburgh a few days ago, it was resolved to recommend the Scottish Mineral Oil Association to adhere to former recommendations.

New Use for Chemicals.—The London Road Car Company are trying the experiment of lighting their omnibuses by means of the electric light. The current is obtained by means of a small battery, the elements of which are diluted sulphuric acid, nitrate of soda, and zinc plates.

Conference on Sugar Bounties.—It is said that the Government have sent out letters of invitation to the Continental powers for a conference on the sugar bounties question. London is proposed as the place of meeting, but the Government are not unwilling to consent to the selection of some other European capital.

Bi-Sulphite Paper Pulp.—The achievements of bi-sulphite in Germany are said to be a menace to some branches of the English paper trade. The large bi-sulphite mill recently built in Mannheim is an undertaking which tells with extraordinary emphasis how profitable and promising bi-sulphite manufacture is in Germany. The adaptability of this pulp to the uses of American manufacturers, says a contemporary, is already proved. Not only has it been imported in considerable quantities from Norway, but the pulp is now made in two mills and finds greedy purchasers. The mill of the Ekman process, near Province R.I., makes an excellent fibre, and has been in operation for two years. The first mill to begin the manufacture under the Ritter-Kellner-Partington process is at Halifax, and found a ready market for its product from the very start, a large portion of it coming to New England. A mill now building at Monico, Wis., is to be operated under the same patents, and so is another mill now going up at Saugerties, N.Y., where W. H. Parsons, ex-president of the American Paper Manufacturers' Association, is to establish the new industry.

The Society of Chemical Industry.—The annual meeting of the Society of Chemical Industry was held in the Chemical Theatre at the Owens College, on Wednesday the 13th inst., Mr. David Howard, the retiring president, in the chair. The Council in their report stated that the number of members on the register was 2,302, as compared with 2,271 at the last annual meeting. During the year 213 new members had been elected and 182 members had been removed by death, resignation, and other causes. Having regard to the continued depression in the chemical industries, and the raising of the subscription of the Society to 25s., this progress, though small, was matter for congratulation. In the papers read before the various sections, Manchester headed the list with 29; London had had 21, Glasgow 19, Liverpool 13, Newcastle 8, Nottingham 4, and Birmingham 4. The Council had pleasure in reporting that, owing to the increased subscription, together with economy in the publication of the journal, the finances of the Society were now in a satisfactory state. A full account of this meeting will appear in our next.

The Liverpool Colour Market.—Colours are unaltered. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s.; Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £17. Red lead, £16. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto lb. jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

The London Metal Market.—Tin firm; Straits, £103. 5s. cash, £103 three months. Copper quiet. Chili bars, g.o.b., £39. 11s. 3d. cash, £40 three months. Lead unchanged. English pig, £12. 5s.; Spanish, £11. 17s. 6d. Spelter: Silesian ordinary, £14. 10s. to £14. 12s. 6d.; special brands, £14. 12s. 6d. to £14. 15. Quicksilver, £6. 15s. first hand.

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SCOTTISH M[illegible] and mining [illegible] trade, held [illegible] recommend [illegible] to former re[illegible]

NEW U[illegible] Company [illegible] buses by [illegible] by means [illegible] diluted [illegible]

CONVE[illegible] Governm[illegible] nental p[illegible] London [illegible] Gover[illegible] some [illegible]

B[illegible] phite [illegible] of [illegible] rece[illegible] with [illegible] bi[illegible] thi[illegible] com[illegible] im[illegible] pol[illegible] Th[illegible] [illegible] Th[illegible] [illegible]

[illegible]ESTER.

[illegible] price in different

		£	s.	d.
[illegible]	per cwt.	[illegible]	10	[illegible]
[illegible]	per ton	2	10	[illegible]
[illegible]	[illegible]	18	10	0
[illegible]	per cwt.	2	5	0
[illegible]	per ton	2	10	0
[illegible]	per gallon	0	2	4
[illegible]	per cwt.	1	4	6
[illegible]	per ton	26	0	0
[illegible]	,,	21	10	0
[illegible]	per ton	25	0	0
[illegible]	,,	21	5	0
[illegible]	,,	5	17	6
[illegible]	,,	18	0	0
[illegible]	,,	19	15	0
[illegible] Swedish	per gal	0	0	5½
[illegible] American	,,	0	0	5½
[illegible]	per ton	24	0	0
[illegible]	,,	10	10	0
[illegible]	per cwt.	2	15	0
[illegible]	,,	1	0	0
[illegible]	per oz.	0	3	8
[illegible]	,,	0	2	8
[illegible]	per cwt.	0	8	9
[illegible]	,,	0	10	3
[illegible]	,,			
[illegible]	per lb.	0	6	0
[illegible] Soda-ash) 48 °/₀	per ton	5	7	6
[illegible] Soda-ash) 48 °/₀	,,	4	0	0
[illegible] Soda-ash) 48 °/₀	,,	4	5	0
[illegible] Crystals)	,,	2	11	3
[illegible] Carbonate) ...	,,	5	6	3
[illegible]	per lb.	0	0	7½
[illegible]	per cwt.	1	10	0
[illegible]	per lb.	0	0	5½
[illegible] (74 °/₀ Caustic Soda)...	per ton	8	5	0
[illegible] (70 °/₀ Caustic Soda)...	,,	7	12	6
[illegible] (60 °/₀ Caustic Soda, white)	,,	6	12	6
[illegible] (60 °/₀ Caustic Soda, cream)	,,	6	6	3
[illegible]bonate	,,	6	5	0
[illegible]sulphite	,,	5	5	0
[illegible] (95 °/₀) ex ship Liverpool	per cwt.	0	9	0
[illegible]ate (glass)	per ton	5	10	0
[illegible] (liquid, 140° Tw.)... ...	,,	5	2	6
[illegible]phate (Salt-cake)	,,	1	4	0
,, (Glauber's Salts) ...	,,	2	2	6
[illegible]phite	,,	5	17	6
[illegible] (metal)	per oz.	0	3	10
,, Bichromate	per lb.	0	0	4½
,, Carbonate, 90%	per cwt.	0	19	0
,, Chlorate	per lb.	0	0	6½
,, Hydrate (Caustic Potash) ...	per ton	23	5	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 °/₀	per ton	11	0	0
,, Muriate, 80 °/₀	per ton	9	0	0
[illegible]sium Hydrate, 42 °/₀	per cwt.	10	0	0
[illegible], Beet	per cwt.	0	13	6
,, Cane	,,	0	14	6
[illegible]ur (Flowers)	per ton	9	5	0
,, (Roll Brimstone)	,,	5	15	0
[illegible]ydrophosphate of Lime (28 °/₀)	,,	2	0	0
[illegible]	,,	21	15	0
[illegible]al)	,,	104	0	0
[illegible]als	per lb.	0	0	7
[illegible]er)	per ton	14	12	6
[illegible] (solution 96° Tw.)	,,	5	15	0

23, 1887.

[illegible]

[illegible] to
[illegible] to
[illegible] to
[illegible] to
[illegible] part
[illegible] brother
[illegible], has
[illegible] energetic
[illegible] of all his

[illegible] Lubimoff
[illegible] the Kama—
[illegible] another firm
[illegible] Solikamsk, or
[illegible] situated in the
[illegible] mountains,
[illegible]. A reference
[illegible] salt district lies
[illegible] between 57° and
[illegible] Russia 74° to 76°

[illegible] the banks of the river
[illegible] from the wharf at the
[illegible] a mile in breadth,
[illegible] eighty miles further
[illegible] Solikamsk the river is still
[illegible] miles or 400 versts, and
[illegible] some two thousand
[illegible] empties itself into the

[illegible] are situated upon the banks of
[illegible], and as the amount of
[illegible] to observe the manner
[illegible] sent down. In the winter
[illegible] of rough-hewn pine logs, upon
[illegible] logs are trimmed with the axe
[illegible] fashion. These barges are
[illegible] of the largest will be of 1,000 tons
[illegible] when built, and the high
[illegible] June floats them, and they are
[illegible] bargemen to a point about eighty
[illegible] Here they wait for steam-tugs to take
[illegible] stream as required; but the principal
[illegible] done with Nishni-Novogorod, where a
[illegible] held in June, and salt, soda, and sulphur
[illegible] the Kama valley for sale. The barges
[illegible] On arrival at their destination they are
[illegible] for fuel, so that their construction is an
[illegible] in the works making these articles.

[illegible] river port of importance, and is the starting
[illegible] good lines of steamers; there is however a
[illegible] running from Perm to Tiumen through
[illegible] Tiumen is on the river Toura, a tributary of
[illegible] is the station to which most of the hides and
[illegible] brought from central Asia for carriage to Perm,
[illegible] are large warehouses for their storage.

[illegible] main line from Perm to *Tiumen, a branch line* [illegible] from *Choosovoy Junction to Verĕtia*, and terminates about a mile and a half from M. Lubimoff's salt works, a private siding finishing the distance. The line from Choosovoy to Verĕtia, runs through a very rich ironstone district where much magnetic iron ore is obtained; there are coal-mines also, but the coal is not yet extensively used in the iron manufacture, as even the blast furnaces are run with [illegible] coal.

The climate of this salt district is peculiar and severe. On [illegible] average, there are three months of summer and nine months of winter; the temperature running about 35° R. in the shade in summer, and – 32° R. in the winter (111° F. [illegible] C. to – 40° C. – 40° F.); but the winter of 1884 was one of the coldest on record, the thermometer several times registering – 50° R. The ice breaks up on the Kama river between the 20th and 25th of April, and by the end of the month it has all disappeared, then the river gradually rises until the middle of June, when it commences to fall. It keeps at high water for about a month, during which time the water level is from 15 to 20 feet higher than during the rest of the year.

The mode of living in this part of the world is simple but healthy; the food plain but good in quality, and plenty in quantity. The houses are usually constructed of logs, and surrounded in all cases by a large garden. The corn is planted in the autumn, and when the April snow and ice has cleared away the green leaves of the plant are a very welcome sight. Strangers generally suffer from a kind of opthalmia, produced by the reflection of the sun's rays falling upon the vast expanse of snow and ice, but this may be guarded against in all cases by the use of green eye-glasses.

Many years ago, in the days of Russian serfdom, grants of land in the Solikamsk district, known to contain rock-salt, were made to certain Princes of the Imperial household. These were worked by the serfs or slaves, the abundant profits being spent by the owners in luxurious living at Paris, St. Petersburg, and elsewhere, being first types of what we now know as absentee landlords. The emancipation of the serfs in 1861 by Alexander II., broke up the Russian salt trade, inasmuch as no one could be obtained willing to work in the mines, except in a few instances. Those mines which are now working are carried on upon the brine system, but very little rock-salt being quarried. All the appliances until quite recently were of the rudest description—horse-gins, hand-pumps, tread-wheel pumps, and many other similar appliances were used to raise the brine from the wells, and the many salt-works now standing idle—many of them in ruins—testify to the fact that there must be no standing still in chemical industry; those who prefer to rest on their oars are certain to be left behind in the race.

This is the district then in which M. Lubimoff essayed to establish the ammonia-soda industry in 1880, but owing to the nature of the climate, the works did not progress so fast as they would have done in this country,—frosts of – 50° R., sufficient to break the bulb of a mercury thermometer, require very different arrangements to those suitable for our own climate, and the most perfect precautions have to be taken with water and liquor pipes, to protect them from such intense cold. In such a country as this the only times available for building are the three summer months, and an unfortunate accident in the shape of the collapse of a large building caused the works to be much longer in course of construction than they would otherwise have been. In such a climate as this all the operations are conducted in closed buildings, the walls of which are often 3 to 4 feet in thickness, and moreover the intense cold of winter compels that the interiors shall be moderately heated, which is usually done with steam-pipes.

At first many difficulties were experienced, chiefly on account of the differences of climate with which the first manager had not been acquainted; but on M. Lubimoff taking the management in his own hands the operations have been a grand success. For several years past the turnout has been equal to 40 tons per diem, and the additions made recently to the plant will enable 80 tons per day to be easily turned out.

A second establishment is about to be erected at Ekaterinoslav in south-west Russia, a town of considerable importance on the Dneiper, and an important junction of several railways; here 30 tons of caustic soda will be made per day, so that by and bye Russia will be able to supply herself with all the soda she requires.

These foreign extensions should be well taken to heart by our manufacturers at home, as it must be evident that the more foreign consumers make themselves the less they will require from England.

THE EXPLOSION AT CORNBROOK.

On Thursday, the 14th instant, the adjourned inquest was held on the body of James Martin, who was killed by the explosion at the chemical works of Messrs. Roberts, Dale, and Co. Mr. Yates appeared for Messrs. Roberts, Dale, and Co., and Mr. Cobbett for an Insurance Company. Detective Sergeant Robinson, the inspector of explosives for Manchester, was also present, and Mr. Sington appeared for Mr. J. Wainwright, whose premises were damaged by the explosion.

The Coroner said Col. Majendie's report was not yet ready; he had written to say that a good many experiments were necessary, and these had not been completed, but he mentioned a date early in August when he would be certainly ready. Mr. R. S. Dale was examined, and said he was the chemist of the firm, and manager also so far as the different chemical processes were concerned. He produced a plan of the works, having the position marked on it of two large holes made by the explosion. With regard to the larger hole he said nothing was being made there at the time of the explosion. One foot from the outside edge of the hole nitrate of lead was being made in troughs. To the left, separated by a brick partition, there was some picric acid crystallising stones, but he was not sure whether or not they were empty. They usually contained a solution of picric acid. There was no other process being carried on near this hole at the time of the explosion. He had no distinct recollection what was stored close to the place where the large hole now is; the space about there was principally used as a gangway. Not far away there was a quantity of nitrate of lead residuum stored in several casks, principally silica. The residuum did not contain any salts. There were also ten or fifteen casks containing oxide of lead, about a couple of tons of copperas in vats, and a quantity of picric acid lying a few yards away. In the neighbourhood of the hole there was also some carbolic acid, and a small quantity of nitrate of strontium. The picric acid was practically the only substance which had entirely disappeared in consequence of the explosion. Some of the carbolic acid had been burnt, and a considerable proportion of the nitrate of lead had been blown away. He had heard that the top of a press, weighing between 3 cwt. and 4 cwt., was found after the explosion in Pomona Gardens, 347 yards away from the scene of the explosion. That press stood originally on the spot where the largest of the two holes made by the explosion is now to be seen. That press would be capable of dealing with from 6 cwt. to 10 cwt. at a time, but it was very rarely used for more than 2 cwt. or 3 cwt. It was chiefly used for pressing lake colouring matter used by paperhangers. At the time of the explosion it was not in use. Under the press there was an open space, but what was stored under it he did not know. The chemical substance nearest the press was the lead residuum; there were also three kegs of arsenic close by. There was no explosive at that side of the yard that he knew of, nor did he think there were any two substances there which, if mixed, would form an explosive.

When asked by the Deputy-Coroner whether he had any knowledge of the cause of the explosion, the witness stated "none whatever;" and when the question was put whether any explosion had occurred before, he said they had had one or two very small explosions in the tin crystals manufacture, but there were no tin crystals in course of manufacture at the *time of the explosion.* He also stated that tin crystals were *not explosive, and it was only in the process* of manufacturing them that the explosion could take place. The witness stat they manufactured the picric acid for dyeing purposes. did not know of any other purpose to which it was p except sometimes to mix with bitter beer. The Coro asked was there any truth in the report that it was being s to the French Government, directly or indirectly. Witn said he did not know. The picric acid was manufactured the usual way. The process of manufacture had not b varied during the last ten years, nor had the proportions b materially altered. It was all manufactured on the side the works in which the explosion took place. The Coro asked the witness to describe the process by which the fi manufactured picric acid. Mr. Yates interposed, and s the firm had no objection to disclose the process to t coroner and jury, but they did not wish to make trade secr known to the public. The Coroner here asked witness if t firm's process was described in books, to which he repli he did not think so. Mr. Yates stated that all the particul of the process had been disclosed to Col. Majendie and M Duprè. The Deputy-Coroner said that being so he wo not pursue the matter in the meantime. The witnes continuing, said: We had about a ton of picric acid stor in three casks on the south side of Cornbrook Road. Tho casks I moved to the side of the canal when the part of t premises where they were stored had caught fire.—T Deputy-Coroner: Why did you do that?—Witness: Becau this was a new revelation to me.—What was a new revel tion? This explosion; and in the case of the fire spreadi we should have put the picric acid into the canal deliberatel —Did you move anything else on to the bank of the canal No.—Why didn't you move anything else; you had oth material about?—Witness: I knew it to be inflammable, an it would have increased any fire undoubtedly.—Had you an suspicion, then, that it was the picric acid which ha exploded? Not the slightest. I was making sure of thing on the side of the road opposite that on which the fire broke out.—Have you never heard of any explosion having previously occurred in the manufacture of picric acid? No, onl the one Col. Majendie mentioned to me.—Where was that I believe it was said to be at Storey's, at Lancaster.—Hav you seen picric acid burning? I have burnt it frequentl myself in its dry state.—It would be, I suppose, more likel to burn immediately after coming out of the stove? I don think so, because the temperature of the stove is very low.— Then you do not think heating makes any difference? I don't think so.—You don't think that heating it makes it more inflammable or more explosive? At what temperature?—The heating it gets in the stove? No, sir, I do not.— What did you burn it for? For purposes of analysis.—In answer to further questions, Mr. Dale said about last November a quantity of logwood black, in a dry state, took fire, but how he had never been able to tell. The firm had ceased to manufacture that substance in the dry state, though they still continued to make it in the pulp state.

The Foreman of the Jury (Mr. Berrie) asked if any two of the articles made on the works would, in combination, form an explosive.

Mr. Dale said that if picrate of lead were produced possibly there might be an explosion. There was nothing in solution about the scene of the explosion but the nitrate of lead. Picrate of lead was not described in the books as a powerful explosive unless it was combined with nitrate of potash. Being asked whether there was any nitrate of potash on the works, Mr. Dale said there was some, but it was at a considerable distance—100 feet—away from the place where the explosion occurred. A portion of it had been destroyed by the fire.

The Foreman of the Jury: Would any combination of any two articles manufactured by you cause this explosion?

Mr. Dale: I don't think it would. I cannot account for it.

The Foreman of the Jury remarked that some of them thought it must be within Mr. Dale's "ken" as to what kind of combination must have been necessary to cause such an explosion.

Mr. Dale said he could throw no light on the matter.

The Deputy Coroner: There must, I suppose, have been

[illegible]xplosive substance to cause [illegible]uch a quantiiy as [illegible] working about [illegible] the jury [illegible] No great [illegible] see how it [illegible] in any way.
[illegible] had been any [illegible] collected in a [illegible] allowed a large [illegible] a drain.
[illegible] of picric acid in [illegible] the smaller hole [illegible] Near to [illegible] boiling was going [illegible] picric acid troughs [illegible] say whether or [illegible] knew was full. [illegible] 13 cwt. of picric [illegible] of the works. [illegible] and that in course [illegible] the two holes, the [illegible] had disappeared. The [illegible] picric in a crude state, [illegible] The picric acid had

[illegible] Manchester Fire Brigade, [illegible] the finding of the body of [illegible] said they could not pro- [illegible] an adjournment was made [illegible] Majendie would be present

[illegible] CHEMICAL INDUSTRY.

[illegible] of the Society held in Manchester [illegible] Mr. David Howard, said it [illegible] a certain discursiveness with the [illegible] of the varied progress of chemical [illegible] by the Exhibition at Manchester. [illegible] fifty years had not seen the first [illegible] of all the branches of the chemical [illegible] few in which that period had not [illegible] of progress, which in many instances [illegible] rather than merely improvements [illegible] they considered these various illustra- [illegible] of applied chemistry they must at once [illegible] which had been attained. First of [illegible] empiric stage, where science had [illegible] ruled supreme the art and mystery of [illegible] term so familiar in old time, and so [illegible] stage reached. They should not undervalue [illegible] was marked throughout by perfection of [illegible] The processes were often imperfect and [illegible] were handed down from one to another by [illegible] apprenticeship, the teacher not knowing himself [illegible] of his own skill. Yet, for all that, the result was [illegible] they could hope to attain with fuller knowledge and [illegible] experience. It was a true sense of the meaning [illegible] art that had led those whom they now called [illegible] the word for themselves alone, leaving those [illegible] industry, who had as much need of true art [illegible] work, with no word to express it. That was all the [illegible] be regretted as the alternative word "craft" had [illegible] much in society as the other had risen. The mis- [illegible] done, and it was in vain for a Carlyle to tell them, [illegible] vigurously, that every worker was indeed a poet, or [illegible] back any other lost meaning to a word. Yet it was [illegible] evil that they should in great measure, whilst losing [illegible], have lost sight of the importance and dignity of the [illegible] manufacture; for, indeed, in the linking of that art to [illegible] instead of to mystery lay the true hope of advance- [illegible] their work. It was well, therefore, to bear in mind [illegible] excellent results *were attained, that they might* [illegible] what *was well worth preserving in the industry of* the past, while making the fullest use of the opportunities of the present. The President proceeded to give some examples of the results of the marvellous excellence attained by the laborious process of unaided experience. The second stage of development—in which the general outlines of science had been grasped, and when what we now considered the merely elementary laws of combination and substitution, of simple and double elective affinity as they were called, were placed at the service of the practical man, and when analysis had become a science and not mere guess work—was naturally the most rapid one. From this stage manufacturing chemistry might be said to begin. Very many of the chemical industries have not advanced beyond this stage, in which elementary rather than advanced science was taken advantage of. In all these things there was evidently great scope for progress. In some, on the other hand, all the resources of science had been brought to bear, and progress must be looked for in science itself before we could expect it in practice. In urging forward, therefore, in the path of scientific industrial progress, which we are bound to do till in all branches of industry all scientific progress was fully appreciated, and while valuing most fully the advantages afforded by science, we should ever do well to avoid what was perhaps a natural inclination, to regard with a feeling akin to contempt the long experience treasured up in traditional rules. Exactly the same process of careful induction and verification was needed in the application of science itself. The work of the scientific chemist must never be regarded as the *terminus ad quem*, but as the *terminus a quo*, and starting therefrom they must work out for themselves the application all the more carefully if the way seemed perfectly plain. The President warned the student not to suppose that knowledge, however perfect, of theoretic results, or the practical ones either, would ever make him a practical chemist unless he had learned the methods of research as well as the results of research. The great danger of the modern student lay in the very fulness of the knowledge ready to his hand. There was no small risk that some might devote all their energies to merely acquiring knowledge, and fall into the snare of imagining that a living dictionary of science, pure or applied, was a practical chemist. The President went on to consider some of the various branches of industry coming within the scope of the Society, referring in some detail to the subject of alkaloids. Turning from the past to the future, he said that amid much that was discouraging in the commercial aspect of chemistry, there was no small reason for a hopeful view of the future in the evidences of increased life in their industries, and of sound method and good work on the part of those who conducted them. Yet there was no easy task before them. The progress of science no doubt made their work easier, but on the other hand it demanded of them continually increasing efforts to keep up to a standard that was constantly being raised to a higher level. It was for them to show that England was not behind other countries in intelligence and aptitude for work. We needed, no doubt, the technical education about which there had been so much talk, but it should be real and thorough to an extent that many who theorised about it had no idea of. Above all, they should know what they did want. He feared that in many minds there lurked an idea that the technical education of workmen would release the employers from the necessity of thinking for themselves. The education of the fingers alone would never make a musician, and unless heads of industrial concerns were willing to be so in deed as well as in name, that harmonious action on which success depended was certainly missed. Without real scientific appreciation on the part of the head, it was impossible that the scientific training of subordinates could be of much avail. Of novel ideas there seemed no lack; it was sound application they needed. Of all that novelty, such as it was, no small portion was ever heard of again. It was surely rather to the practical working out of ideas that they should look for progress than to mere fertility of invention, although there might be like abundance, as of seeds in nature which yet could never come to maturity without the seed bed and the farmer's fostering care.

MR. DAVID HOWARD, PRESIDENT.

After the meeting the members were left free to visit the Royal Jubilee Exhibition, and at 6 p.m. the annual dinner was served in the Palm House there. On many occasions much has been said regarding the catering for this Exhibition, but we feel bound to say that the members there assembled on Wednesday last will not forget being served with what was believed to be tinned peas and tinned asparagus in the height of the season.

After the dinner was over many of the members returned to the Victoria Hotel, where a new surprise awaited them. The Chemical Club, sub-tenants in the hotel, had invited members from a distance, and many had engaged rooms in the hotel. Judge of their surprise when returning from the Exhibition, to find all the furniture removed from their rooms and their wearing apparel thrown into a heap in the centre of the floor. On going from their rooms to those of the Chemical Club to find shelter, desolation was found here also, the books, journals, stationery, and other property of the club was piled on the floor and all the furniture removed. In fact, to cut a long story short, the "bums" were in, the Corporation having taken possession. So our visitors left to find more genial treatment elsewhere, many of them heaving a sigh of pity that a Corporation which had already committed so many mistakes over this property should have committed another error of judgment, and at a time, too, when it was most important that the financial state of the hotel should not be publicly discovered.

The Corporation of Manchester owe an apology to the members of the Manchester Section of the Society of Chemical Industry and to their visitors, and we guess that they will only add another link to the chain of errors by withholding it.

SIR HENRY ROSCOE, M.P., CHAIRMAN OF THE MANCHESTER SECTION.

It does not seem that there were many chemical engineers at the meeting, as only two names were down for visiting the "Otto" gas engine works, and five for Messrs. Beyer and Peacock's, the Gorton Engineering Works. Messrs. Kerr and Hoegger's, Grimshaw Lane Dyeworks, were more fortunate, and about a dozen visitors joined this excursion. They were *shown over* all the works, and served with luncheon at one *o'clock. To Messrs. Ermen and Roby's* mills, at Patricroft, about a dozen members found their way, while a very large party visited the printworks of Messrs. S. Knowles and Co., at Tottington, near Bury. After seeing the works the party was entertained right royally to luncheon in a marquee on the top of Holcombe Hill. The members one and all expressed themselves very pleased with what they had seen, and thanked the Messrs. Knowles for their kindness and attention. Mr. John Hollingworth, the proprietor of the Ashwood Dale Lime Works at Buxton, entertained a party of visitors, and conducted them over his quarries and lime-works, where some patent kilns, as well as those of the ordinary pattern, were seen. The lime produced at these works is of excellent quality, and the machinery for crushing and screening will serve for a very large output. After visiting the works Mr. Hollingworth entertained the visitors to luncheon at the Shakespeare Hotel, and afterwards drove them to Poole's cavern and to Bakewell, from which station the train was taken to Manchester. Mr. Isidor Frankenburg kindly threw open his large indiarubber works to the members, and a large gathering assembled to see the processes so peculiar to this manufacture. Mr. Frankenburg personally conducted the party, and that the visit was not a cursory one may be judged from the fact that two and a half hours were spent in the works.

MR. J. CARTER BELL, LOCAL HON. SECRETARY.

On Thursday, a large party visited the brewery of the Wrexham Lager Beer Co., and spent a very pleasant day there. Luncheon was provided by the directors for the large number of visitors, who took great interest in the various processes they saw there being carried on.

On Thursday, also, special omnibuses were provided to take the members to the spinning mills of Messrs. Howarth and the paper mills of Messrs. Chadwick and Taylor, and from thence to the Exhibition. The Corporation of Salford had invited the members to visit their gas and sewage works, and the visitors were received by the Mayor and Corporation and members of the various committees and permanent officials. The gasworks were duly inspected by the visitors as well as the sewage works, the details of which were explained by Mr. Jacob, the borough engineer, by whom they were designed. A very substantial and excellent luncheon was provided by the Corporation, so that the visitors will not carry away from Salford any reflections of their treatment in Manchester on the previous day.

On Friday, a large party left for the valley of Castleton to visit the Blue-John Mine, the Shivering Mountain, Peveril Castle, and the celebrated Peak Cavern; while another party went to Glossop to visit the paper mills of Messrs. Olive and Partington and the printworks of Messrs. Potter and Co.

Saturday concluded the sightseeing, when Mr. Charles Truby allowed a party to see over the aniline works at Clifton Junction, which had been postponed on account of a breakdown in the works.

Taking it as a whole the meeting was very enjoyable and quite a success. Chemists when they are "out" know well how to take care of themselves, and it does not need any expulsion from a hotel by bailiffs, or unseasonable food, to make them enjoy themselves on the morrow.

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Were it not for some further remarks in the abstract bearing upon the ability of young German as compared with young English chemists the above quotation might be allowed to pass; but as Sir Frederick seems to be possessed of the popular but somewhat erroneous notion—that because a chemist is a German he is therefore a better chemist than if he were English,—I take the liberty of addressing a few observations on the subject at the risk of being reduced to an impalpable powder for so doing.

It is perfectly true that the basic process has been more rapidly developed—perhaps adopted would be the better word—in Germany than in England, but let it not be supposed that it is the English chemists who are at fault. I think the fault lies with the manufacturer. If the English chemists were worse than their own the Germans would not fetch them from England to look after basic works, and as to the phosphatic slag, its agricultural value has been pointed out by chemists here and in Germany for a year or two; but at any rate so far as England was concerned it was as the voice of one crying in the wilderness. It was conservatism versus enterprise; it was the proverbial conservatism of English manufacturers that prevented their being in the van with the basic process; while on the other hand it was to the enterprising spirit of the German manufacturers rather than to the greater efficiency or ability of their chemists that its development was due. That same enterprising spirit emboldens them to send their swords and cutlery, such as it is, from Solingen to England; to send their emissaries to be corresponding clerks in our steelworks' offices, to our Lancashire factories to learn loom-making and cotton spinning, and that recalls them with a number of Lancashire made looms to set up factories in Germany to manufacture cotton goods to compete with ours in the markets of England and the world; and that sends young German Ph.D's to this country to learn chemical methods in our chemical works, to return some day to Germany with their results; it is to this same spirit of enterprise that the development of the basic process there is due. I do not blame the German, but I do say we should not blame the English chemist. Sir Frederick Abel admits further on that "we have succeeded in maintaining a foremost position in the iron and steel manufacture," and I could have wished that he had more prominently claimed for English chemists the credit of beating the Germans in this branch, to which he has himself I believe contributed so much useful work. I can certainly agree with the statemement however, for having to examine by chemical analysis and physical tests samples of thousands of tons of steel, I can unhesitatingly say that the German steel I have met with reflects little credit upon either the German manufacturer or the German metallurgical chemists, its only recommendation being its price, suggestive of the idea "cheap and nasty." The English are better steel chemists than the Germans. Sir Frederick then goes on to speak of the manufacture of coal-tar colours, to show how the Germans have passed ahead of us in this one branch of chemical industry, and he says :— (The italics are mine.)

"The young chemists which the German manufacturer *attracts* to his works rank much higher than ours in the general scientific training which is essential to the successful cultivation of the habit of theoretical and experimental research, and in the consequent appreciation of and power of pursuing original investigations of a high order."

Do they? I doubt it; but of this I am sure, that if Sir Frederick Abel and others holding high rank among English chemists preach this doctrine from their housetops, there is no wonder if a good many English employers come to believe in it. I have italicised the word *attracts*, because I am in doubt if English manufacturers do *attract* chemists, they *would mutually benefit if it were so.*

But I should like to know if, as Sir F. Abel says, the general scientific training of German trained chemists is so superior to ours, and if they manage these things so much better there how it comes to pass that our manufacturers who have for years been employing the young German Ph.D. have not attained as good results as the Germans? I do know of a works in England where they employ German chemists, and where they are doing well; but then the proprietors are German, and it is conducted on a different plan to other English works, they do not allow visitors to go through.

And again, where are all those young English chemists, the dozens, for instance from South Kensington and other schools, who have gone to Germany, and in two or three years returned to England full-blown Ph.D's., where are they? Do they not outshine the works' chemists of purely English training? Where is the result of that "higher general scientific training," "habit of theoretical and experimental research," "power of pursuing original investigations of a high order?" etc., etc. I am curious, to use a familiar expression, I "want to know y' know," for I have for a few years thought that much of the talk about German chemists' superiority is of the bosh, boshy.

But I think Sir Frederick Abel touched the real secret when he said "moreover the research laboratory constitutes an integral part of the German factory," from which I presume it follows that it is made worth the chemists while to conduct research or other work required in that laboratory. Contrast this with that spirit of conservatism which made a Lancashire firm of chemical manufacturers do without a chemist as long as they possibly could, and when at length they were forced by circumstances to employ a chemist in the hope of galvanising their moribund business into new life, they went about it as if they meant serious business by knocking down a wall between a stable and a wash-house, converting them into one room, and dignifying this with the title of "The Laboratory." Selecting a greenhorn fresh from school, paying him about one-third the wages of an ordinary engine-tenter, keeping a tight hand on what he spent in chemicals and apparatus, talking largely about "our chemist," and when they found their horses' heads still turned towards the bankruptcy court, they said they wondered why the ——, but perhaps their lacerated sensibilities had better be inarticulate.

On the other hand, it is that spirit of enterprise on the part of the German manufacturer which causes him to make the research laboratory an integral and really important part of the works, regarding his chemist as being indispensable and valuable. He does not make his chemist the least important servant, and regard the foreman or cash-clerk as more necessary.

To conclude, sir, I must emphatically express my conviction that we have men in the ranks of English works' chemists as good at least as the Germans, able and willing to do all that may be demanded of them, provided they receive sufficient remuneration for it; but they may surely be excused for not doing too much for employers who pay them a pound a week—less than they pay the engine-tenter. And with regard to technical schools, we shall never turn out efficient men from these while it is the fashion to fill chairs of technical chemistry with book-men and graduates, making a 'varsity degree a *sine qua non*, instead of actual experience in chemical manufacture. We too often see men appointed to these posts whose only claim is a D.Sc. or Ph.D., to which qualification is sometimes added the fact that their fathers are eminent chemists, or they have been demonstrators to some distinguished professor, etc., while the fact that they have never spent a week in a chemical works is ignored. So that as far as technical chemistry goes they resemble Lord Byron's hero who could be silent in nine languages.

The sooner these men of words are replaced by men of actual experience—by men who in addition to having a good sound theoretical training, have had long experience as chemical engineers and manufacturing chemists—the sooner shall we wipe out the stigma that we are being beaten by foreign competitors.—I am, etc., MENENIUS.

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[illegible]

[illegible] Street, Manchester.

[illegible] in U.K. *The prices in different*

	£	s.	d.
[illegible] (Brown) ... ... per ton	10	0	0
[illegible] (Grey) ... ... ,,	14	0	0
[illegible] (Ribbon and wire) ... ... per oz.	0	2	6
[illegible] Chloride ... ... per ton	2	5	0
[illegible] Carbonate ... ... per cwt.	1	17	6
[illegible] Hydrate ... ... ,,	0	10	0
[illegible] Sulphate (Epsom Salts) ... per ton	2	10	0
[illegible] Sulphate ... ... ,,	19	10	0
[illegible] Borate ... ... per cwt.	2	5	0
[illegible] Ore, 70 %, ... per ton	2	10	0
[illegible] Spirit, 60° O.P. ... ... per gallon	0	2	4
[illegible] (Wood), Solvent ... ... ,,	0	4	3
,, Miscible, 60° O.P. ... ,,	0	5	4½
[illegible] Castor ... ... per cwt.	1	4	3
[illegible] ... ... per ton	21	10	0
[illegible] ... ... ,,	21	10	0
[illegible] Scotch, 885°—890° ... ,,	5	17	6
[illegible] Russian ... ... per gallon	0	0	5½
,, American ... ... ,,	0	0	5½
[illegible] (metal) ... ... per oz.	0	3	8½
[illegible] Nitrate ... ... ,,	0	2	8½
[illegible]:—			
[illegible] ... ... per cwt.	0	8	9
[illegible] (farina) ... ... ,,	0	10	3
[illegible] (metal) ... ... per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 %, per ton	5	0	0
,, ,, (Caustic Soda-ash) 48 %, ,,	4	0	0
,, ,, (Carb. Soda-ash) 48 %, ,,	4	2	6
,, ,, (Soda Crystals) ... ... ,,	2	12	6
,, ,, (Crystal Carbonate) ... ,,	5	6	3
,, Chlorate ... ... per lb.	0	0	7½
,, Borate (Borax) ... ... per cwt.	1	10	0
,, Bichromate... ... ... per lb.	0	0	3½
,, Hydrate (74 %, Caustic Soda)... per ton	8	5	0
,, ,, (70 %, Caustic Soda)... ,,	7	10	0
,, ,, (60 %, Caustic Soda, white),,	6	10	0
,, ,, (60 %, Caustic Soda, cream),,	6	6	3
,, Bicarbonate ... ... ,,	6	5	0
,, Hyposulphite ... ... ,,	5	5	0
,, Nitrate (95 %,) ex ship Liverpool per cwt.	0	9	0
,, Silicate (glass) ... ... per ton	5	10	0
,, ,, (liquid, 100° Tw.)... ... ,,	4	5	0
,, Sulphate (Salt-cake) ... ... ,,	1	4	0
,, ,, (Glauber's Salts) ... ,,	2	2	6
,, Sulphite ... ... ,,	5	17	6
Potassium (metal) ... ... per oz.	0	3	10
,, Bichromate ... ... per lb.	0	0	4½
,, Carbonate, 90% ... ... per cwt.	0	18	9
,, Chlorate ... ... per lb.	0	0	6 7/16
,, Hydrate (Caustic Potash) ... per ton	23	0	0
,, Nitrate (refined) ... ... per cwt.	1	2	0
,, Prussiate Yellow ... ... per lb.	0	0	7½
,, Sulphate, 90 %, ... per ton	10	15	0
,, Muriate, 80 %, ... per ton	9	0	0
Strontium Hydrate, 40 %, ... per cwt.	10	0	0
Sugar, Beet ... ... per cwt.	0	13	0
,, Cane ... ... ,,	0	14	6
Sulphocyanide of Barium ... ... per lb.	0	0	6
,, Ammonium ... ... ,,	0	0	9½
Sulphur (Flowers) ... ... per ton	9	5	0
,, (Roll Brimstone) ... ... ,,	5	15	0
Superphosphate of Lime (28 %,) ... ... ,,	2	0	0
Tallow ... ... ,,	21	15	0
[illegible] (metal) ... ... ,,	104	0	0
[illegible] Crystals ... ... per lb.	0	0	7
[illegible] (Spelter) ... ... per ton	14	12	6
[illegible]loride (solution 96° Tw.) ... ... ,,	5	15	0

[illegible] 10, 1887.

[illegible]TS.

[illegible] there [illegible] to the [illegible] opinions. [illegible] we have [illegible] to mere [illegible] of all [illegible] entirely [illegible] spring up [illegible] in scientific [illegible] as they [illegible] members of the [illegible] which has [illegible] the system of [illegible] to us the [illegible] matter bristling [illegible] nothing of the [illegible] by a judge who, [illegible] evidence extracted [illegible] who have, perhaps, [illegible] lives before, and who, [illegible] a witness in order to [illegible] more or less to study the [illegible] understand their brief, and [illegible] distinct from those of the [illegible] extracted with this natural [illegible] the witness is often led off [illegible] has never explored, and [illegible] to the case in point.

[illegible] from ordinary civil actions, [illegible] upon scientific men by judges [illegible] account of differences of [illegible] themselves during the extraction of [illegible] if our worthy friends of the [illegible] look upon the facts as evidence [illegible] scientific men agree very well with [illegible] one of the exact sciences; the [illegible] upon weights and measures [illegible] would be but little cause for disagree- [illegible] of the chemical profession, but the [illegible] from their analyses are, to some extent, [illegible] previous experience of other reactions [illegible] in point. One may have had some [illegible] a long course of years which a younger [illegible] profession has not had the opportunity to see, [illegible] opinions should be counted as being of some [illegible] a careful sifting it is not advisable to [illegible] as being incontrovertible. The late [illegible] once said in one of his reports, "If we [illegible] ally, that is, fully and exactly, the laws which [illegible] phenomena of the world, the scientific man [illegible] only to speak, and on all physical points his [illegible] be oracles;" but the judge or the jury in the [illegible] of the administration of the law hear only the [illegible] character of his opinions, and even of his experi- [illegible] brought out by counsel in such a way as will tend to [illegible] damage in the case. The information on scientific [illegible] is elicited in such a manner by the examining counsel [illegible] best in a forensic point of view. Minute differ- [illegible] things, and in the properties of things, of the first [illegible] to a scientific man reasoning as to effects and [illegible] bable causes, are often missed though fundamental [illegible] guments, or, as often happens, are misunderstood [illegible] counsel, by judge, and by jury. In the examination [illegible] ific witnesses the members of the bar seem to be of [illegible] that a complete answer to *many of their questions* [illegible] even in Yes! *or No!* *We are pleased to be able to* enlighten them upon this subject, and to say that if they continue to retain this opinion they were never more mistaken in their lives, and we have often been told by scientific experts that nothing is more annoying than to be examined or cross-examined by a barrister who knows nothing at all about the subject he is examining upon.

THE TWENTY-THIRD ALKALI ACT REPORT.

III. NITRIC ACID WORKS.

THE chief inspector does not give any account in his prologue of nitric acid works, yet those who live in the vicinity of such establishment, know well that they are not altogether blameless in the matter of producing and disseminating noxious vapours. It seems to be a moot point what is and what is not a nitric acid works, and on account of the faulty manner with which the Alkali, etc. Works Act of 1881 was drafted, the most egregious offenders are likely to get off scot free. If we take the nitric acid works pure and simple, we have no doubt that there is but little fault to be found with them, the only time they are likely to be a nuisance is when the receiver has met with an accident, which is not however of frequent occurrence, or when the cylinder itself has given way; in the first case the vapours escaping are emitted at a low level, while in the latter case, the nitric acid which should have gone into the receivers finds its way into the fire flue, and issues from the chimney in dark red fumes. With these exceptions, the nitric acid works may be stated practically inodorous.

We now come to the paradoxical part of the Act; the manufacturers may make nitric acid and be bound to condense practically the whole of it, but if they use this nitric acid in another portion of their work, and produce thereby a large evolution of nitrous vapours, it has been decided by the late chief inspector that such a process does not come strictly under the notice of the inspectors, and that they have no power to step in and say that such vapours must be condensed. Of course many manufacturers have not been so neglectful of their neighbours welfare as to allow these gases to be sent into the atmosphere without some attempt being made to condense them; but it is a notorious fact that many users of nitric acid have let the whole of the nitrous fumes escape into the air without making the slightest effort to prevent it. And why? Simply because the Act of Parliament only commences to interfere with them when they commence to do their duty. It has been decided that a nitric acid works is a works in which nitric acid is manufactured, and that inspection is only legal in and about the apparatus where that special manufacture is located; that the inspector has no power legally to see any other part of the works wherein this nitric acid manufacture is situated, and hence we have the paradox, which is not easy to understand by any other argument than that the proverbial coach and four may be driven through any Act of Parliament. The decision already leads to some very curious results. A manufacturer of nitric acid on establishing himself in business is bound to submit to inspection, and as we have said before, he is also bound practically to condense the whole of his nitric acid; if, however, instead of selling his nitric acid he chooses to make nitrate of iron with it, he may send the whole of the nitrous fumes evolved into the air without let or hindrance. Surely this state of things was never contemplated by the legislature? And now we come to the point where the paradox commences. If this manufacturer should say to himself "It is really too bad on my part to disseminate these noxious fumes amongst my neighbours, I must condense them, as by doing so I shall be making a further profit for myself." Directly this manufacturer commences to condense these fumes he becomes a manufacturer of nitric acid within the meaning of the Act, and the inspectors who had no power over him while he was emitting 50 per cent. can have now the power to say, "You must adopt the best practicable means for suppressing the whole."

We may yet quote another instance; manufacturers of nitrobenzene and binitrobenzene generally make their own

nitric acid, and they are bound to do this well, but when they use this nitric acid in a further stage of the process to binitrify the benzene, they may send out the whole of the nitrous fumes without the inspector saying a word. Of course, in the majority of cases, nitric acid users are far too keen to let these products escape into the air; but there are very many instances indeed where such is not the case. Some years ago there was a growing tendency on the part of many dyers and calico printers to manufacture their own chemicals or such of them as could be readily made without much outlay – a few tubs and pans were the order of the day, and no attempt whatever was made to condense the nitrous and other fumes, and we believe the practice is still very extensively carried on. Of course there is no inducement for these people to condense the vapours, they are probably insufficient in value when condensed, to pay the interest on the capital of the condensing plant and the Government licence, and the proprietors know full well that they are treading on dangerous ground if they attempt condensing.

We should have thought there was very much interesting matter on the subject of nitric acid works, seeing that nitric acid is so largely used in many chemical industries, and in the majority of them the acid cannot be used without causing the escape of nitrous vapours. In the twenty-third Alkali Act Report the chief inspector is silent on all these points, and we hope we have opened the gate to a new field of inquiry which may bring some information in the twenty-fourth report.

BUTTERINE v. MARGARINE.

We have received a copy of a petition to the House of Lords from "the provision merchants and dealers who are interested in the manufacture, importation, and sale of butterine." The petition sets forth that the object of the Margarine Bill is to impose a penalty on all persons who shall hereafter call butterine by the name by which it has been known for the last twelve years, and to compel all persons dealing in butterine to call it by the name of margarine, which is the name of a different substance, namely a substance which forms one, but one only, of the constituents of butterine. In the Committee it was abundantly proved –(1) That butterine has been openly sold as butterine for upwards of twelve years; (2) that butterine is a useful article of food, and is made from as wholesome material and in as cleanly a manner as butter itself; (3) that margarine and oleomargarine are for commercial purposes identical, though, scientifically speaking, they differ as distinct and different articles; (4) that margarine (or oleomargarine) is one of the constituents of butterine, the other constituents being vegetable oil, milk, butter, salt, and a little colouring matter, all churned together and prepared in a highly skilled and careful manner; (5) that manufacturers of butterine have had great difficulties to contend with owing to the prejudice against butterine, by false statements made by interested parties with a view to induce the public to believe that it is made from unwholesome materials; (6) that the prejudice against butterine has been gradually removed, and any change of its name would have a most prejudicial effect upon the trade; (7) that it was proved before the Select Committee of the House of Commons, by public analysts and others, that if butterine is fraudulently sold as butter there is no difficulty in detecting the fraud; (8) that the public officials have no objection to the word "butterine," and are unable to suggest any word which will more fitly describe the article which is now sold under that name. The ve statements can, if necessary, again be proved by evi- ce. The petitioners submit ' change the name of an e from that by which it ' own will cause great warrantable confusio ind that no instance found where Par erfered to compel alter the name o mmodity in which t for a numl ' making a mar- they hav d embarked alter t at incon- lic, as a sub- tance which is quite unfit to be used as a substitute for butter, and it would take a long time before the public would learn that the word "margarine" meant what they have so long known as "butterine." The interests which the petitioners represent are of great magnitude. The Board of Trade returns show that the imports into this country during January, 1887, amounted to 103,957 cwt., or in money value £330,452. The petitioners have no wish to sell butterine as butter, and no objection to penalties being imposed on persons fraudulently doing so, but they do object to their trade being interfered with in the manner proposed by the bill. The petitioners therefore pray that the bill may not be allowed to pass into a law as it now stands, but that should the House think it expedient that provision should be made for regulating the importation, manufacture, and sale of butter substitutes, the bill may be referred to a Select Committee who may fully inquire into the matter, and insert in the bill such amendments as may be necessary for the protection of the petitioners.

AGRICULTURAL CHEMISTRY.

During the last thirty years very many discoveries have been made in connection with the soil, and it is a pity that these and the lessons they have taught have not been more closely studied by those for whose benefit they were made. It is conclusively shown that plant life can be supplied with the food which it requires, and this is called fertilising the the soil. It is scarcely possible to exhaust a soil, for there is always plant food or fertility left, even though the same land be cropped year after year without manure. This food is probably out of reach of the plants which have grown upon it. The chemists have analysed soils, as well as almost all varieties of plants. They practically know what each contains, and are therefore able to show for the guidance of the farmer what manure he should adopt for the cultivation of his crops. There is, however, much to learn still, for nothing has been made too clear, and one discovery only points to greater discoveries yet to come, and to the necessity of the farmer bringing common sense to bear upon the knowledge which is placed before him. There is always scope for a farmer to think out a question in connection with manuring. If he closely watches the growth of his crops he will ascertain probably that some of the plant foods are deficient and the others are in excess, and in this way he will ascertain sufficiently well what properties of each kind of manure he ought to use for a particular crop. It is clearly more difficult to fertilise a soil containing one element in abundance—other being deficient—than a soil which is almost exhausted. The French agricultural chemist Ville has prepared complete mixtures of artificial manures upon the basis of an exhaustion of the soil in its chief elements—that is to say, all soil which contains little or none of the chief foods upon which the plants feed. For wheat, barley, oats, rye, and meadow grass his complete artificial is as follows, the same being used at the rate of 5½ cwt. per acre:—

	Per cent.
Superphosphate of lime	33·34
Nitrate of potash	16·66
Sulphate of ammonia	20·83
Sulphate of lime	29·17
	100·00

In plainer language, there are in every 100lb. of the mixture 33⅓lb. of superphosphate, about 16½lb. of nitrate, 20¾ of sulphate of ammonia, and 29lb. of lime. A crop of wheat yielding 15 bushels per acre will take nearly 15lb. of phosphoric acid from the soil, and an acre of ground might go producing wheat for two hundred years before the phosphoric was all gone. But fortunately a growing plant looks with suspicion on the least deficiency, and applies itself with appetite only to the overflowing platters. This is the reason the fertility of soils so rapidly diminishes until they reach a certain degree of exhaustion, when they refuse to give up

e large quantities which made them at first seem so . In a new land like America this pecularity of trikingly exhibited. In a few years the yield per ks to a minimum, and remains stationary there estored by artificial means. Nature seems thus to a defence of the future against greed of the present. l be safe to say that could a soil be made to yield up ents in a continued maximum there are few who esitate to abuse the willingness of the present, any thought of the penury of the future.

ISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

eldon's patent of 1866 (1,948, July 26th), he claimed in the manufacture of chlorine of an artificial sesqui- manganese, or of any practical equivalent thereof, oxide, or mixtures of oxides inferior to sesquioxide, capable of liberating chlorine when such oxides or of oxides is obtained substantially by the method d;" and, secondly, he claimed "the conversion of e of manganese into the said higher oxide or mixture s, by injecting atmospheric air into a mixture of the oxide with water or other neutral fluid."

specification Mr. Weldon did not bind himself to ny theoretical constitution of the mud, but there is hat it behaved as an ordinary sesquioxide, for the says "it liberates exactly the amount of chlorine ccording to theory a pure sesquioxide would."

s in this specification that the operation of oxidising tills was minutely described, and to illustrate how s known at that time of what was practicable and s impracticable, we have only to refer to the specifi- where it is stated that the cheapest plan of air injec- s to blow at such a rate that the whole of the oxygen orbed and only nitrogen allowed to escape. By so , the protoxide of manganese was stated to be con- into the sesquioxide, which was either settled or or even further dried in a hydro-extractor.

specification must have caused Mr. Weldon some for in the complete specification we find these —"I desire here to add that although when I drew up visional specification I believed that an attempt had ready made to use in the manufacture of chlorine ide of manganese, obtained by the atmospheric n of the protoxide resulting from the double decom- between chloride of manganese and an oxide of etal, and that this failed in consequence of the method tion adopted oxidising the protoxide only exceedingly ctly. I have since found that I had been incorrectly d on this point. Further inquiry has convinced me attempt to carry any such process into practice was de, nor can I find in the records of the Patent office, y of the books treating of the chemical industries any of any such process ever having been even suggested. tterly hopeless proposals for modification of the pro- y which chlorine has hitherto been manufactured have tented, but all experiments previous to my own with to the use for the liberation of chlorine, of artificial ide of manganese, supposing any such experiments to en made, have clearly been so little encouraging to ho have made them, as to have precluded them either to obtain the protection of a patent for any process on the result of such experiments, or even placing sults on public record in any way whatever."

patent was sealed on January 22nd, 1867. There is ubt that working as nearly as is described in the fore- pecification, there was a great variation in the quality oxide produced, but at that time it was not learned is variation came about. Sometimes a higher oxida- an the sesquioxide would be obtained, but no one ood the reason why. On January 18th, 1867, Mr. n obtained protection for "the production of an l peroxide of manganese, *meaning thereby* an oxide ing more *than 55 per cent. of peroxide, by injecting* atmospheric air into a mixture of an inferior oxide of manganese, with water or other neutral liquid." On September 4th, by specification 2,501, ozonised air was protected. We may now take a more complete survey of the results which had actually been obtained during these two years of work.

(To be continued.)

LIQUID FUEL.

An exhaustive series of tests with liquid hydrocarbons, in their application to the firing of steam boilers (in this instance one of a marine type) are about to be carried out by Mr. B. H. Thwaite, C.E., of Liverpool.

The tests will be very interesting, as they are to be as completely analytical as possible. The oils—creosote and ostaki from Baku—are being analysed by Mr. A. Allen, of Sheffield, and Mr. W. Thomson, of Manchester, is colorimetrically testing the oils. The gases resulting from the Thwaite system of combustion of the oils are also to be analysed. The effects of a plenum supply of air, air and steam, and steam *per se*, will be ascertained. The Thwaite system of combustion is essentially a scientific one, so that the exact thermal value in practice of liquid fuel will be ascertained precisely.

We believe the results are to be given at the next British Association to be shortly held at Manchester.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

VIII. DESTRUCTIVE DISTILLATION—SUNDRY SUBSTANCES MADE FROM INTERMEDIATE MATERIALS.

Under the head of destructive distillation we find several substances coming strictly under the head of intermediate materials—carbolic acid and its manufactured products, salol, saccharine, the cyanides and sulphocyanides, and the intermediate products of wood distillation. On the whole, the collection of these products cannot be looked upon as typical of the manufactures of the district. The distillation of wood has been carried on in the neighbourhood of Manchester for years, yet the only exhibit we can find in this direction is that of Mr. Watson Smith, the lecturer on technical chemistry at Owens College.

Messrs Charles Lowe and Co., of Reddish near Stockport, exhibit a unique but severe looking Stand at 739, containing carbolic acid in its various stages of manufacture, from the crude to the pure product, together with the resulting by-products, such as cresol, paracresol, naphthalene, etc., which are obtained during the manufacture of the pure article.

The whole of the carbolic acid at present in the market is produced from coal-tar, from a ton of which about two or three gallons of the crude acid is obtainable. Crude carbolic acid is a clear brown fluid of about 1,060 specific gravity, obtained from tar in the following manner:—the tar is distilled, and after the water and crude naphtha have come over, the next portion of the distillate known as light oil, is treated to extract the carbolic acid it contains. For this purpose the "light oil" is agitated with caustic soda solution of a gravity of 1,090, for one or two hours, and the aqueous solution, which is substantially carbolate and cresylate of soda, is drawn off and decomposed with an acid, by which means the tar acids are thrown out of combination, and float on the surface of the saline liquor. This is the crude acid generally met with in the market, and as it varies much in quality, Mr. Lowe devised a test by which it is now all sold, and which is described on another page. This crude acid is submitted to various distillations in order to get it into a state of purity, and the uncrystallisable portion or cresylic acid, is usually sold for disinfecting purposes, and for making disinfecting powders.

Commercially pure carbolic acid is the starting point of an interesting series of colouring matters, viz., picric acid, aurine, azurophenolene, chrysophenolene, etc., and of course of the

picric salts also, which have lately come into use again as explosive agents. Specimens of these colouring matters are to be seen in the case exhibited by Messrs. Charles Lowe and Co., together with specimens of dyed materials showing the shades obtainable by their use. The sulphocarbolates of many of the metals are also specialities of this firm.

In the official catalogue of the Exhibition there is noted a Stand 734, stated to be exhibited by Messrs. Fahlberg, List, and Co., of the Saccharine works at Magdeburg. We have on several occasions looked for this exhibit and failed to find it; but as we have been collecting information for an article on the subject, we are enabled to give some information respecting it upon another page.

Some very interesting intermediate products of destructive distillation are to be found in the case of Messrs. Hohenhausen and Co., at Stand 745. Aniline oil, aniline salt, the various acetates, and sulphocyanides are to be found here; they are all largely used in the calico printing industry, and this is a branch of chemistry which many English firms might well investigate. Even to-day, when sulphocyanides are scarce, the alkali makers and soap makers are wasting their whole production; but the most serious waste is taking place in the sulphate of ammonia works, where all the sulphocyanide of calcium present in the liquors is run down the nearest drain. Mr. A. H. Allen, of Sheffield, has shown us how the sulphocyanides of the soap makers may be recovered, and no doubt by and bye we shall find some of these salts in the market from this source.

THE TESTING OF CRUDE CARBOLIC ACID.

The crude carbolic acid of commerce is usually sold to the makers of refined or pure carbolic acid in the same state as it is obtained from the tar, and as it is very variable in quality it is usually sold by chemical analysis.

The test employed is an empirical one, but is extremely useful in dealing with this product. Into a small still or flask holding about 200 c.c., 100 c.c. of the crude carbolic is placed, the condenser thereto being formed from a piece of glass tubing about three-quarters of an inch (18 m.m.) in external diameter, and about a yard long, so as to be cooled only by the atmosphere. The distillation is commenced, the flask or still being preferably heated by means of a rose burner, and regulated so that the distillate is thoroughly condensed before it leaves the end of the condensing tube. The distillate is collected in a 50 c.c. graduated tube on foot, and the operation is continued until the whole of the water has been expelled, and 10 c.c. of an oily looking liquid, heavier than the water, collected. At this point the graduated jar is changed for one of 100 c.c. capacity, graduated into single c.c., and 62½ c.c. collected, the test for the solidifying point being made upon this quantity.

The 62½ c.c. collected is now stirred with a thermometer and cooled, the point at which solidification takes place being noted. In the winter time there is no trouble in cooling sufficiently by means of water alone, as most crude carbolic solidifies about 60° F. (15·5° C.), but in summer a freezing mixture is often requisite, and this is generally made by mixing Glauber's salts with strong muriatic acid. Eight parts of Glauber's salts and five of muriatic acid will reduce the temperature of the mixture about 27° C.

It is not easy without many previous experiments to directly ascertain what percentage of real carbolic acid a sample of crude contains, but we give this test as it is usually applied in commerce, as we believe there is at the present time much so-called carbolic acid being sold for disinfecting purposes, both to private firms and municipal corporations, which does not contain any carbolic acid whatever.

THE MANCHESTER CHEMICAL CLUB.

The recent complications at the Victoria Hotel have caused the President to look out for other rooms, and a *meeting was held on the evening of* Monday, the 25th, "To consider the future habitation of the Club." The Club is stated to consist of nearly 150 members, but few of them ever attend, and in response to a circular calling the meeting only eleven members were present. Mr. Levinstein stated that Mr. J. Carter Bell had searched for rooms near the Exchange, but could not meet with any, and proposed that the rooms offered them by the manager of the Grand Hotel at £80 per annum be accepted. Mr. Davis suggested that now was the time to carefully review the past history of the Club. It might be perhaps true that there were 150 names of members, but how long would they continue? Many of them had for some time been grumbling at the Victoria Hotel as being too far away from the Exchange; what would they say then to coming to the Grand Hotel? It was a fact which ought to be considered, that there were only about two hours a week when the club was used at all, and that was between two and four on Tuesday afternoons, when business men came off 'Change, and perhaps some half-dozen assembled, and he ventured the opinion that without some artificial method was adopted, such as was used at the formation of the Club, members would not be got together at all. Many had told him they would not subscribe again, and this fact should certainly be taken into consideration in engaging rooms. It was eventually agreed to take the rooms subject to a three months' notice, so as to give an opportunity to see how things went on.

The Club has recently had a severe blow financially. Mr. Levinstein had promised £100 or £150 towards the funds of the Club if he should win his case against the Badische Aniline and Soda Fabrik, and as this case has now been decided against him the Club cannot reckon on this increment.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday Morning.

Holidays are nominally over, and works gradually resume wonted scale of production, after having utilised, according to custom, the short stoppage of make by applying a hurried refit to furnaces and manufacturing plant. In some few instances operations may hardly be said to have recommenced, on account of slackness of demand, but by the close of the week even these will again be into all the activity they dare at present hope for. Paraffin crude oil and refining works are all disorganised from a complication of disturbing causes, chief of these being a combined strike of shale miners and retort men, resulting in the case of two or three of the companies in complete cessation from all work. This is affecting the product market appreciably, and if continued will leave still more of a mark. Sulphate of ammonia, for instance—the Scotch turn-out of which forms a goodish slice of the whole supply—has been done at about existing very good values, to cover so far ahead as a portion of next year's deliveries. Paraffin spirit, also, is becoming dear and scarce, while makers are not at all anxious to fix anything in it for forward. Makers of bichromates (potash and soda) are doing very little for home consumers, and foreign orders have not been abundant; prices unchanged. Makers of bleach have been supplying hardly anything to local consumers, but a fair number of east country orders have been done at figures as below. Prices current are—Soda crystals, 46s. 6d., net Tyne; alum (lump), £4. 15s., less 2½ % discount, Glasgow; borax, £31, and boracic acid, £46, net Glasgow; soda ash, 48/52°, 1d., less 12½ °/₀ Tyne; caustic soda, white, 76°, £9. 7s. 6d.; cream, 60/62°, £6. 7s. 6d, less 2½ °/₀ Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52°, 1⅝d., less 5 °/₀ Tyne; salt-cake, 23s. 6d. to 24s.; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 °/₀ Glasgow; bicarbonate of potash, 4½d., and bichromate of soda, 3½d., less 5 °/₀ f.o.b. Glasgow; nitrate of soda, 8s. 9d. to 9s.; chlorate of potash, 6d., less 5 °/₀; sulphate of ammonia, £12. 10s., f.o.b. Leith; paraffin scale, 1½d. to 1¾d.; wax (good semi-refined), 2⅜d. to 2½.; and spirit (naphtha) about 5¾d. spot, sellers quoting 6½d. to 6¾d. for forward.

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SACCHARINE.

UNDER the name of saccharine a new product of coal-tar is now to be met with in the market. Saccharine is the body discovered in 1879 by Dr. Constantine Fahlberg, when experimenting with the toluol sulphamides; its scientific name is andydro ortho sulphamine benzoic acid, and the formula is—

$$C_6H_4 < \begin{matrix} CO \\ SO_2 \end{matrix} > NH$$

It is stated by the inventor to be three hundred times as sweet as sugar, and the only body known of such marked sweetness. The manufacture of this substance has been commenced on a large scale by the inventor and his partners, trading under the name of Fahlberg, List, and Co., at Salbke, Westerhüsen, near Magdeburg. They have now commenced active operations, and will be able to supply saccharine in bulk in the course of this month. Whether this substance is destined to become common in those manufactures specially adapted to food-stuffs is a question which time only can answer, but it is advertised as being of great service to brewers, chocolate and cake manufacturers, and many other purposes. Its absolute harmlessness on the animal system has been proved by the highest medical authorities, and its importance for use in medicine and pharmacy sufficiently demonstrated. It is stated to be a wonderful corrector for the bitter taste in preparations of the organic alkaloids such as quinine, and may be useful in the preparation of wines for medicinal purposes, and almost every medicine.

It is not necessary to describe here the method by which saccharine is manufactured, as the process has been already sufficiently stated in the patent specification of Dr. Fahlberg, but it may be briefly said that it is a preparation of toluene, the substance found in the light distillate of coal-tar, and forming the principal portion of the rectified product known as 50 °/₀ benzene. Saccharine is but little soluble in water. Pure water does not dissolve more than about $\frac{1}{10}$th of 1 per centum of saccharine. It is more soluble in hot water, and may easily be obtained from such a solution in the crystalline form. Alcohol dissolves it more readily, and saccharine becomes more soluble as the strength of the alcohol is increased; 10 °/₀ alcohol dissolves ½ °/₀, while absolute alcohol dissolves just above 3 °/₀. The maximum solubility, however, is when 70 °/₀ alcohol is employed, in which about 3·1 °/₀ dissolves.

Ether dissolves it readily, and its solubility can be increased at pleasure by the addition of any carbonate of an alkali or alkaline earth. The inventor states that there are many uses to which saccharine may be applied. In the United States alone over 500,000 bushels of maize are daily converted into sugar; this sugar is mixed with cane sugar, and used principally in the *manufacture of confectionery, liqueurs*, etc.

Grape or starch-sugar disolves saccharine with facility, and may be sweetened by this means to almost any degree; one or two parts of saccharine mixed with 2,000 parts of starch-sugar forms an excellent substitute for cane sugar where body and sweetness are required.

When it is desirable to produce a high degree of sweetness in a comparatively small quantity of substance, saccharine may be used with advantage, and it may also be employed in aqueous and alcoholic solutions, as in the manufacture of lemonade, champagne, etc.

The prejudice which declares that artificial products are injurious to health will soon give way to a more rational view, and though the present price of saccharine is rather high, a demand for it would soon cause a decrease in its price; but, nevertheless, a mixture of starch-sugar sweetened with saccharine can, even at its present price, be produced far cheaper than that at which cane sugar now stands.

Notes and Queries.

THE BADISCHE ANILINE AND SODA FABRIK *versus* LEVINSTEIN.—A final judgment in this case was given in the House of Lords on Tuesday last. It will be remembered that the plaintiffs sued Mr. Levinstein for infringing their patent in the manufacture of certain colouring matters. The defendant endeavoured to prove that the patent was bad, and, therefore, that no infringement had taken place; but the House unanimously affirmed the patent to be valid, and pronounced in favour of the Badische Aniline and Soda Fabrik, as against Levinstein, thus restoring the decision of Mr. Justice Pearson. It is said that the costs of these repeated trials cannot be less than £20,000.

THE NEW AMMONIA-SODA WORKS.—The Manchester and Liverpool District Banking Company Limited, at its principal offices and branches, has been authorised to receive applications for 46,000 preferred shares of £5 each in the Cheshire Alkali Company Limited. The capital of the Company is stated at £300,000, comprising 60,000 shares, the present issue being the greater proportion, whilst the remaining 14,000 will consist of deferred shares, all of which the vendor has agreed to accept as representing his purchase money. The preferred shares will bear a cumulative dividend of 7 per cent. on the paid-up capital, and rank for further dividends out of surplus profits *pari passu* with the deferred shares, which carry a similar dividend of 7 per cent. The company has been formed for the manufacture of alkali and other chemical products, more especially by the ammonia-soda process, under improvements by Dr. Pick (formerly manager for Brunner, Mond, and Co. Limited), which were patented by Thos. Capper, on communications from Dr. Pick. Besides these patents the company acquire the exclusive right to all improvements by Dr. Pick during the term of the patents, and exclusive authority to patent the existing and all such future improvements everywhere except in Germany and Austria-Hungary, in which latter country Dr. Pick has already established works on his process. A patent has already been granted in France for the existing improvements, and is included in the company's purchase. Important and valuable freehold property has been acquired by the company in Cheshire, and the advantages claimed by Dr. Pick are stated in the prospectus.

COLOUR MARKET.—Colours without change. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £17; red lead, £16; oxide of zinc, V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d.; Zaffres, No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra alba, finest white, 60s.; good, 40s. to 50s. Rouge, best, £24; ditto jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Paris white, 60s. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

A Novel Patent.—A rather curious patent, entitled "Improvement in petroleum oils," is intended to protect small consumers, who have no opportunity of examining brands or trade marks. The patentee suggests that the different qualities should have a distinguishing colour, so that consumers might have a ready means of ascertaining at a glance the quality of the petroleum supplied. As the patent has now been sealed, both the office and the patentee are evidently satisfied.

The Shale Miners.—The agitation in connection with the reduction of the wages of shale miners in West Lothian still continues, and at one important works at least the men are practically locked out.

Pollution of the Eagley Brook.—The further hearing of the combined action of Eden and Thwaites and Blair and Sumner *v.* Deakin was brought to a close, before Mr. Justice Kay, on Tuesday, the 12th inst., in the Chancery Division. His Lordship granted the injunction against the defendants, with costs, restraining them from sending into the Eagley Brook, by means of a trough or otherwise, any polluting matter to the damage of the plaintiffs, the injunction to be suspended for six months to enable the proper remedies to be applied.

A Petroleum Disaster.—A disaster which in several respects resembles the appalling calamity at Abergele occurred in a Canadian town on Friday, the 15th inst. An excursion and a goods train came into collision, at right angles, on the rails in the heart of the town of St. Thomas. Two of the waggons were laden with petroleum. Crowds of people rushed to the assistance of the sufferers by the collision, and at that moment a petroleum tank in the goods train exploded. The consequences were dreadful. It is known that by the collision and the subsequent explosion at least fourteen lives have been sacrificed on the spot, whilst the injured number over a hundred. It was said that the collision was due to the failure of the air brake of the excursion train.

Explosion in a Malt Mill.—The South Cheshire Brewery, situate in Wistaston Road, Crewe, was on the 14th inst. almost entirely destroyed by fire. About 6-30 a.m. an explosion took place in the malt mill. The roof of the building, which is of considerable height, was set on fire, and the whole building was soon in flames. The town fire brigade were assisted by the brigade from the London and North-Western Railway works, and the fire was got under in about three hours, but not before the whole of the brewery part of the building was destroyed, together with several hundred pounds' worth of hops, malt, &c. The damage is estimated at £2,000. This is the third occasion on which a fire has broken out in the same building. The loss is covered by insurance.

The Sugar Trade in Cuba.—Intelligence from Havana states that the situation of the sugar planters is somewhat embarrassing owing to the prices of sugar for some time past. Some unimportant failures have been reported, but there is no feeling of panic, and it is expected that matters will improve by means of Government aid.

London Indigo Sales.—The third auction of the year commenced on the 13th inst., with a declaration of 6,690 chests, 290 chests since withdrawn, leaving 6,400 to be brought forward. These may be classified as follows:—Bengal, 2,182 chests; plant, Oude and Oude, &c., 148; Kurpah, 3,214; Madras, 328; Bimlipatam, 17; Bombay, 416; sundries, 95; total, 6,400 chests. Since April sales the market has been very quiet, the large proportion then sold (4,800 chests) supplying all requirements.

The Failure of Mr. J. R. Hay-Gordon.—At the London Bankruptcy, on Monday, the 4th inst., Mr. Registrar Brougham made a receiving order against this debtor upon a creditor's petition, he being described as formerly of Liver-[illegible] present address is unknown. Messrs. [illegible] Gulling and [illegible] half of the petitioning creditor, stated [illegible] and all been served by post to the [illegible] Nothing is known of the debts or [illegible] own in Widnes, where he formerly [illegible] manufacturer, his works

Cocaine.—The demand for cocaine as a local anæsthetic has had an effect on the export of coca leaves from Peru, the quantity sent from Mollindo during the past year being 705 quintals of the value of $17,625.

Academic Honours.—The name of Mr. H. Lloyd Snape, son of Mr. Thomas Snape, of Liverpool, and head master of the chemical department of the Manchester Technical School, appears in the list of the successful candidates at the recent examination for the degree of Doctor of Science of the University of London.

Activity in the Welsh Iron Trade.—In consequence of the continued activity in the Welsh iron trade, the blast furnaces at the Cwmavon Iron and Steel Works in the Avon Valley were blown in afresh on Saturday, the 9th inst.

Waste Zinc Recovery.—The Vine Chemical Company, of Lugsdale, who have for some time been engaged in the recovery of waste zinc products, are now making further additions to their products, instead of being tied to putting them on the market in paste and solution as at present.

The Recent Rise in Bleaching Powder.—The rise in value lately occurring in the case of bleach has been caused by the purchases of the Metropolitan Board of 5,000 tons for disinfecting purposes. There is now no available bleach in the market, and will not be before Christmas.

Further Fall in Scotch Oil Shares.—On Monday, the 18th inst., the depression in the Scotch oil shares was accentuated by a serious panic in Young's Paraffin, the oldest and the largest of the various undertakings. A circular has been issued by the directors announcing the failure so far of the scheme to borrow £285,000 on debentures, and on this becoming known there was a complete collapse in the shares, which fell as low as 10s. The nominal capital of the Company is over a million sterling, and the shares which stood at £9 in January last have fallen to the level quoted above.

Fire at a Chemical Works.—On Tuesday, the 19th inst., a serious fire occurred at the tar distillery of Messrs. Ellison and Mitchell, at Swinton. It appears that on the afternoon of that day the anthracene tank sprung a leak which trickled down into the fire of the portable forge, placed in the building of which this tank formed the roof. In a few moments the whole place was in one sheet of flame, and the heat was so intense that much of the iron work about the spot was fused together. The damage is not covered by insurance.

Swiss Customs' Tariff.—A Bill has lately been presented to the Federal Assembly for the purpose of revising the present tariff, which chemical manufacturers should study.

Importation of Pyrites from Spain.—During May, 1886, over 48,000 tons of pyrites were brought into the United Kingdom from Spain; last May (1887) no less than 58,000 tons were imported.

Free Trade in Wheat.—The Chicago "wheat corner" has collapsed. After raising the price to 94 cents a bushel the combination collapsed, and the price has fallen to 74 cents.

Native Soda in China.—In many parts of the plains of Manchuria the earth is so strongly impregnated with soda as to pay for extraction. The earth is digested with water to extract the soluble matter, allowed to settle and the clear liquor boiled down to the nearly solid state, when it is cast into blocks weighing between 60 and 70 pounds apiece. These blocks are used by the native dyers and soap makers, and possess the following average composition:—

Water	7·2
Insoluble	4·3
Carbonate of soda	37·3
Nitrate of soda	4·0
Sulphate of soda	22·8
Chloride of sodium	24·4
	100·0

We have also received a sample of native soda from Egypt having a very similar composition.

A fire broke out on Saturday, the 23rd inst., at a large naphtha spring at Balachana, north of Baku, and is still raging. The conflagration has extended to the boardings of several other springs, and to a store containing about one million pounds of naphtha.

The Derbyshire Lead Mines.—A Sheffield correspondent writes:—In days gone by lead mining was an important Derbyshire industry, but changing circumstances have rendered it almost valueless, and large districts of the Peak are honeycombed with deserted and ruined workings. A striking illustration of the change that has taken place was afforded the other afternoon at Sheffield, when four lots of lead mines were put up for sale by auction. One lot, consisting of the Fielding Gate Mine and the Shining Cliff Mine, in Middletondale, with a moiety of the Burrs Mine, sold for 10s.; 648 out of 1,152 shares in the Water Grove United Mines sold for 25s., and the lot fetched £10. A fourth lot of mines, "for many years very rich and offering an unusual opportunity for investors," sold for £120.

Letters from Delagoa Bay state that there has been found on Sir Donald Currie's concession in Swaziland an immense body of low grade ore, very soft, decomposed, but practically inexhaustible. It is looked upon as one of the best gold finds that has ever been made in South Africa.

We have been informed that Hamburg is now connected with Berlin by telephone. The distance between the two cities is over 150 miles.

The Widnes Trade.—The following articles were used and produced in Widnes last year:—Pyrites used during the year for the manufacture of sulphuric acid or salt cake, 147,250 tons; burnt ore produced, about 105,000; burnt ore treated by wet copper process, 117,800 tons; metallic copper produced, 4,100.

THE SULPHATE OF AMMONIA MARKET.

The sulphate market is just now quiet, and speculators are predicting lower values, but it is difficult to see how lower prices can come about with the existing disturbance in the Scotch oil trade, and with stocks so small as they are at present. The agent of the Gas Company still keeps his price up for London quotations, but it is rumoured that he is accepting lower prices for his direct dealings on the Continent. What this means it is not difficult to see, and it is having a depressing effect on the market. The tone is, however, very healthy, as with so little being put on the market as is now the case, prices can hardly fall seriously if makers will realise their true position and not give credence to the "no demand" scares.

THE TAR PRODUCTS MARKET.

Benzols are weaker, and 2s. 6d. is now quoted for 50/90, while 3s. 1d. is stated to be the value of 90's. It is the opinion of many that benzol will fall to 2s. 6d. for 90's or even lower, as this is generally the strong season of the year, and makers are saying if benzol is declining now in July, what will it recede to when the large production commences in October. It is quite evident that gasworks have not seen the worst of low prices yet, and it strikes us very forcibly that many gasworks will have to return to tar burning this winter if they wish a general improvement in prices. Anthracene is still firm at 1s. 3d. for A and 1s. for B quality; crude carbolic acid is selling well at 3s. for 60's, while creosote is getting scarce, though there is no substantial improvement in price.

THE PATENT LIST.

9933. John Jenkin Harries. An improved heating apparatus for consuming liquid hydrocarbons. July 15.

9936. Charles Henry Mc.Euen. Improved apparatus for regulating the pressure flow of gas. July 15.

9943. William Augustus Mitchell. Improvements in the purification of vegetable oils and fats, and the obtainment of useful products therefrom. July 15.

9944. William Moore Riddell. Improvements in the purification and oxidation of oils. July 15.

9949. Emile Auguste Sengel and Louis Ferdinand Dobler. An improved manufacture of gelatinised cloth or artificial parchment. July 15.

9953. Thomas Henry Gray. Improvements in the mode of refining vegetable oils for illuminating or alimentary purposes. July 15.

9956. Andreas Carl Drenkhan. Improvements in apparatus for evaporating or boiling milk and other matters. July 15.

9957. Joseph Trassl and Heinrich Luidner. Improvements in and relating to the manufacture of thin plates and other articles of glass. July 15.

9968. Peter Cook. Glazed waterproof paper canisters or boxes capable of holding jams, jellies, marmalades, boiled sweets, and all food products for transit. July 16.

9994. Thomas Richard Shillito. An improved apparatus for impregnating water with carbonic acid. (Complete specification.) July 16.

10023. William Tapp. A water-softening apparatus. July 18.

10043. William Phillips Thompson. Improvements in the manufacture of aluminium, magnesium, calcium, and similar metals and their alloys. July 18.

10057. Ernest de Pass. A process for the extraction of aluminium from its flourides by electrolysis. July 18.

10060. Thomas Roxburgh. An improved process of making manure. (Complete specification.) July 18.

10093. Charles Joseph Beyer. Process or processes and apparatus for obtaining pure alumina compounds from bauxit and similar materials containing alumina. July 19.

10127. John James Hood and Alfred Gordon Salamon. Improvements in the desulphurisation of gaseous and other products. July 19.

10135. James Alfred B. Bennett. Improvements in the method of recovering tin from tin scrap and similar substances. July 20.

10137. Thomas Ferneley Wiley. A new or improved process of and apparatus for waterproofing textile fabrics. July 20.

10144. Samuel Hallsworth and Richard Bailes. Improvements in or relating to the manufacture of copperas and of ferric, sulphate, or sesquipersulphate of iron, commonly called nitrate of iron. July 20.

10153. John Fleming. Improvements in connection with the calcining of sulphurous ores. July 20.

10154. John Fleming. Improvements in the construction of chambers or tower wherein acids are generated, or through which they are passed, the said improvements being applicable to the construction of condensers or tanks used in the manufacture of acids. July 20.

10168. William H. Knowles. Improved apparatus for generating carbonic acid gas, for forcing or raising beer and other liquids, or for other purposes. July 20.

10216. George Downing. Improvements in the method of and in means and appliances for regulating the pressure of liquids and gases. July 21.

10222. Samuel Hallsworth and Richard Bailes. Improvements in or relating to the manufacture of ferric, sulphate, or sesquisulphate of iron, commonly called nitrate of iron. July 21.

10223. Samuel Hallsworth and Richard Bailes. Improvements in the manufacture or preparation of a certain material to be used for dyeing purposes. July 21.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

		£	s.	d.
ACIDS:—				
,, Acetic, 25 °/₀	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6¾
,, Arsenic	per cwt.	0	13	6
,, Chromic	per lb.	0	0	8
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.,	per bottle	0	0	6
,, ,, (cylinder) 30° Tw.	,,	0	2	6
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4¼
,, Sulphuric (fuming 40 °/₀)	,,	12	0	0
,, ,, (Brimstone 168°)	per ton	4	5	0
,, ,, (Pyrites 168°)	,,	3	10	0
,, ,, (spent oxide 168°)	,,	4	0	0
,, ,, (,, 150°)	,,	2	5	0
,, ,, (Pyrites 150°)	,,	2	0	0
,, Tartaric	per lb.	0	1	7½
Arsenic, white powdered	per ton	10	15	0
Alum	,,	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3½
,, = 24°	,,	0	0	1⅛
,, Carbonate	,,	0	0	3½
,, Muriate	per cwt.	1	2	6
,, ,, (sal-ammoniac)	,,	36/- & 34/-		
,, Sulphate (grey), London	per ton	12	12	6
,, ,, (grey), Hull	,,	12	15	0
Aniline Oil	per lb.	0	0	10½
,, Salt	,,	0	0	9
Antimony	per ton	38	0	0
,, (tartar emetic)	per lb.	0	1	2
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	3	0	0
,, Sulphate (native levigated)	,,	3	10	0
Bleaching Powder, 35 °/₀	,,	7	15	0
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	13	0	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 °/₀ f.o.b. Goole,	per unit per cwt.	0	1	3
Benzol, 90 °/₀	per gallon	0	3	1
,, 50 °/₀	,,	0	2	6
Carbolic Acid (crystallised 35°)	per lb.	0	1	2
,, (crude 60°)	per gallon	0	3	0
Creosote (ordinary)	,,	0	0	1¾
,, (filtered for Lucigen light)	,,	0	0	2½
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	1	3
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston	,,	0	13	6
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	39	15	0
,, Sulphate	,,	13	17	6
,, Oxide (copper scales)	,,	36	10	0
Glue	per cwt.	1	17	6
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	53	0	0
Iron (turnings)	,,	1	13	0
,, Peroxide (blue billy)	,,	0	7	0
,, ,, (bog ochre)	,,	1	13	0
,, ,, (precipitated	,,	3	0	0
,, Sulphate (copperas)	,,	1	2	6
.. Sulphide (antimony slag)	,,	1	0	0
et) for cash	,,	13	10	0
te (white)	,,	26	5	0
(brown)	,,	18	10	0
	,,	22	10	0

		£	s.	d.
Lime, Acetate (brown)	per ton	9	15	0
,, ,, (grey)	,,	14	5	0
Magnesium (ribbon and wire)	per oz.	0	2	6
,, Chloride	per ton	2	5	0
,, Carbonate	per cwt.	1	17	6
,, Hydrate	,,	0	10	0
,, Sulphate (Epsom Salts)	per ton	2	10	0
Manganese Sulphate	,,	19	10	0
,, Borate	per cwt.	2	5	0
,, Ore, 70 °/₀	per ton	2	10	0
Methylated Spirit, 60° O.P.	per gallon	0	2	4
Naphtha (Wood), Solvent	,,	0	4	3
,, ,, Miscible, 60° O.P.	,,	0	5	4½
OILS:—Castor	per cwt.	1	4	6
Cotton-seed	per ton	21	10	0
Linseed	,,	21	5	0
Lubricating, Scotch, 885°—890°	,,	5	17	6
Petroleum, Russian	per gallon	0	0	5¼
,, American	,,	0	0	5⅜
Silver (metal)	per oz.	0	3	8
,, Nitrate	,,	0	2	8
STARCHES:—				
Sago	per cwt.	0	8	9
Potato (farina)	,,	0	10	3
Sodium (metal)	per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀	per ton	5	7	6
,, ,, (Caustic Soda-ash) 48 °/₀	,,	4	0	0
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	5	0
,, ,, (Soda Crystals)	,,	2	11	3
,, ,, (Crystal Carbonate)	,,	5	6	3
,, Chlorate	per lb.	0	0	7½
,, Borate (Borax)	per cwt.	1	10	0
,, Bichromate	per lb.	0	0	3½
,, Hydrate (74 °/₀ Caustic Soda)	per ton	8	5	0
,, ,, (70 °/₀ Caustic Soda)	,,	7	12	6
,, ,, (60 °/₀ Caustic Soda, white)	,,	6	12	6
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	8	9
,, Bicarbonate	,,	6	5	0
,, Hyposulphite	,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	8	9
,, Silicate (glass)	per ton	5	10	0
,, ,, (liquid, 100° Tw.)	,,	4	7	6
,, Sulphate (Salt-cake)	,,	1	4	0
,, ,, (Glauber's Salts)	,,	2	2	6
,, Sulphite	,,	5	17	6
Potassium (metal)	per oz.	0	3	10
,, Bichromate	per lb.	0	0	4½
,, Carbonate, 90%	per cwt.	0	19	0
,, Chlorate	per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash)	per ton	23	5	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 °/₀	per ton	11	0	0
,, Muriate, 80 °/₀	per ton	8	5	0
Strontium Hydrate, 40 °/₀	per cwt.	10	0	0
Sugar, Beet	per cwt.	0	13	6
,, Cane	,,	0	14	6
Sulphocyanide of Barium	per lb.	0	0	6
,, Ammonium	,,	0	0	9¼
Sulphur (Flowers)	per ton	9	5	0
,, (Roll Brimstone)	,,	5	10	0
Superphosphate of Lime (28 °/₀)	,,	2	0	0
Tallow	,,	21	15	0
Tin (metal)	,,	104	0	0
,, Crystals	per lb.	0	0	7
Zinc (Spelter)	per ton	14	12	6
,, Chloride (solution 96° Tw.)	,,	5	15	0

SATURDAY, AUGUST 6, 1887.

ZARINE COLOURS IN THE HANDS OF THE PRACTICAL WOOL DYER.

BY C. ROMEN.

e inquiry for fast colours capable of standing, fulling, lling is on the increase, and the manufacturers of colour-aterials now find that this demand is covering a larger

former times, fastness was never considered a *sine qua* that is to say from the time when the old vegetable s gave way to the more brilliant tar derivatives, as practical dyers seemed to recognise it as a foregone ssion that fastness and brilliancy were not compatible. e terms of purchase, the order was generally given that louring matter was to be "as fast as possible," and this guarantee was usually accepted without further exami-; while others made fastness a secondary consideration, beauty of appearance the preference. To-day, we face to face with the reverse side of the picture—the nt demand is for fast colours which will also stand g without loss of shade.

m the fierce, fiery colours we have returned to those, owing to their depth of shade appear dull by the side e former. On account of the altered taste, and the nd on the part of the public for fast and solid colours, ave changed from the sharp light tints, to the inter-bly varying fashion shades of darker tones. Where, I are those colours produced by so many fiery but fugitive es? They have disappeared from the industry of n and wool, for the greater part, having had to make for a somewhat heavier tone and more solid effect. Not , however, have the aniline colours fallen a sacrifice to ew situation; but the storms have assailed the hitherto gnable vegetable colouring matters.

e bulwark "madder" has long since disappeared; the ements of sandal-wood-red are all but down, and only in nner castle does queen indigo, surrounded as she is with powerful black vassals, hold unmoved the blue-black l with the yellow cross. Many a hard battle will have e fought ere the indigo queen is vanquished, and if uished, the conditions of capitulation are still very tionable.

we examine the aggressor more minutely, we shall find a powerful knight in red armour, at his side rides another ht in blue, while behind these there is a goodly number ssals and serfs. Although these vassals may be of darker n and of more dubious derivation they are powerful , and lead with them a useful set of warriors. On the hand, there fights for himself, the red-brown knight of green valleys of the Maine, who desires the fall of the ess. He does not appear to stand on a good footing the knight in red, but they are both unanimous as to ns for the attainment of the end in view.

powerful ally to both has been met with in recent —we refer to the black azarin queen, from the kingdom aphtha, who has suddenly appeared on the plain with black warriors, ready to break a lance with the black als of queen indigo.

is an interesting picture—the battle of the new fast dye-s against the old and well-tried companions of our daily k, who can with justice call a thousand years their own. hangs upon antiquity and calls custom his wet nurse; it would be absolute madness for him to close his ears to convincing language of facts. Self-preservation becomes uty, and the important modern advances show that we only at the commencement of a new era.

he leading part in the conflict of the new colouring matters the old ones has been taken by the alizarine colours, and nding to all appearances they will maintain it. It is by means our object to recapitulate what has been already lished regarding dyeing with the alizarine *colours, but in* remarks which follow *we have endeavoured to* trace a picture as to their history, the state of their present applications, the favour they have met with to-day, and also their distribution, their future, the objections which have been raised against their use, and the refutation of any such objections.

As to the early history of the alizarine colours, it may be specially said that the Badische Anilin and Soda Fabrik was the first factory in the tar-colour branch, which, during a series of years, really met the requirements of the dyers and calico-printers in a commendable fashion. Their factories at Stuttgart and Ludwigshafen have always kept touch with the consumers, and they have met the wishes and the requirements of the trade from the very first. It was the first firm which engaged experienced dyers, and educated colourists in order to work out proceeses for utilising the colours as discovered, and to render them suitable for practical work, while from time to time their employés have made experiments in factories, causing these colours to be brought into general use. This is still going on to the fullest extent, as will be confirmed by all those who have visited and studied the dyeing and printing laboratories at Stuttgart and Ludwigshafen. It is a pleasure to be able to state that the German aniline factories have followed this example, and thus we see the colour chemists working hand in hand with the dyeing chemists with every success as regards the requirements of the trade.

The practical dyers have ranked themselves with the theoretical colour chemists, and how many of the latter have received hints from the former regarding the application of new colouring materials of which otherwise they would have known nothing. If this had been the case formerly, much plant which now rests in old iron would have held its place in dignity and honour.

With the appearance of the colour chemists the peripatetic vendors of dyeing recipes have vanished. Let us be thankful; for whoever has discovered this individual at the termination of long-winded circulars cannot have avoided forming a bad impression of him.

While to-day we are almost overwhelmed with the blessings of new colours, almost at every moment, the coal-tar colour manufacturers have had some consideration for the much-tormented dyer, who received but little help in the early days of the industry; but now he may at once begin to use these colours without any expensive experiments, so that he may eliminate the old ones without any detriment to his operations.

For the fact that a turn for the better has taken place in this direction we must thank the road-breaking activity of the Badische Fabrik. With a very great expenditure of time and money, they have rendered the alizarine colours available for use: they have furnished interested parties with the most exactly worked-out recipes, accompanied by colour patterns showing their effects on the most varying materials in different styles. But they have even gone further than this, as inasmuch they have caused shades to be worked out in their laboratory, and experiments on the large scale, made and watched over by their own dyeing chemists in the works of the various interested parties. The importance of such services as these can scarcely be over estimated.

The man who brought the alizarine colours to their present state of perfection from a practical point of view, and who well deserves recognition, on account of having rendered them available for wool dyeing is Dr. H. Brunck, the General Director of the Badische Anilin and Soda Fabrik in Ludwigshafen, who attacked the subject with perseverance and courage, and has accomplished their introduction under his own personal superintendence, having always striven to render the latest discoveries in this branch available for practice.

Dr. Brunck's name is associated in the most intimate manner with the history of the alizarine colours. To his unceasing energy we owe the fact that the chain of alizarine colours is now a closed one, in which no colour is wanting, the new alizarine black completing the chain. His greatest service to the industry is, however, this, that he early recognised the importance of alizarine colours for wool dyeing, and introduced them into practice after much opposition.

[illegible] of the Badische [illegible] of the late [illegible] united for [illegible] taken into con- [illegible]—a sign that a [illegible] has by no means [illegible] into different [illegible] products obtained as [illegible] We [illegible] at the outset those which [illegible] cinnamic acid— [illegible] at the same time the most [illegible]

[illegible] R.P. 11,857, 19th March, [illegible] from orthonitro- [illegible] cinnamic acid dibromide [illegible] the orthonitro- [illegible] "propiolic acid") [illegible] derivatives. The addi- [illegible]—N. 11,858, 12,601, 14,997, [illegible] the very complicated [illegible] the further course of the [illegible]

[illegible] technical importance, and [illegible] what is known as [illegible] the fourth additional patent No. [illegible] of xanthic acid salts for [illegible] acid." The five other patents [illegible] of practical execution, and have [illegible] ensure that no infringements [illegible] Again, the cinnamic acid is the starting [illegible] the manufacture of this is also [illegible] patents. After the first method, which is a [illegible] called Perkin's reaction, toluene is [illegible] under the influence of heat, and the [illegible] a high temperature with dry acetate [illegible] cinnamic acid direct. D.R.P. 17,417 and [illegible]

[illegible] second method, benzoic aldehyde (oil of [illegible] acetine are employed, which forms the [illegible] acetine, a product capable of being [illegible] of lime into cinnamic acid, D.R.P. No. [illegible] Which of these two methods deserves the preference [illegible] on a very large scale is a matter which can [illegible] determined with difficulty, as in the first instance, so [illegible] in the second, that a large consumption might [illegible] influence prices. According to the first, and prac- [illegible] expensive process, the yield of cinnamic acid does [illegible] reach the theoretically possible; while in the second, [illegible] expensive mode of procedure, the processes run [illegible] smoothly.

Further improvements must not be expected in the mean- [illegible] cheaper methods of production for cinnamic acid [illegible] be thought of, so that any great reduction in [illegible] production of this substance seems to be almost [illegible]

The further transformation of cinnamic acid into orthonitro- [illegible] acid is completed in the following phases:—

1. Transformation of the cinnamic acid into its ethyl ether by treatment with alcohol and sulphuric acid.
2. Nitration of the cinnamic acid ether thus obtained by means of nitrate of soda and sulphuric acid.
3. Separation by means of alcohol of the ortho and para- [illegible] cinnamic acid ethers into almost equal parts.
4. Separation of the orthonitrocinnamic acid ether into [illegible] orthonitrocinnamic acid by treatment with sulphuric [illegible]
5. [illegible] of the dried and ground orthonitrocinnamic [illegible]
6. Obtaining the orthonitrophenylpropiolic acid by the treatment of orthonitrocinnamic acid bromide with a concentrated aqueous solution of caustic soda.

The waste of assisting materials—nitric acid, bromine, and alcohol—only slightly exceeds the theoretical, and they can moreover be in part regenerated, while the chemical operations of the separate phases run so smoothly that from a technical point of view they may be regarded as quantitative.

ain, consequently only a few strides can be made n the perfection of the separate processes, from a as well as from a chemical point of view. The disadvantage of this method must now be noted. In on of the cinnamic acid ether there are invariably s already stated, two different preparations, the the paranitrocinnamic acid ethers, almost in equal , which must then be separated by a special process. ortho combination is applicable for the production : if, however, it became possible to conduct the f cinnamic acid ether in such a manner that only the bination takes place (which theoretically does not be impracticable) then the production of "propiolic ld be considerably simplified, the output doubled, price could be reduced one-half.

ous experiments however in this direction have up en without any results whatever, the formation of innamic acid ether in the proportion named seems avoidable, so that it becomes a matter of simply l of the uncomfortable ballast in the most advan- anner. We may imagine that experiments enough made in this direction, but each and every one has attain the desired end. The prospect of utilising innamic acid ether in large quantities has also been l, and D.R.P. No. 15,743 provides for its conver- paranitrobenzaldehyde, a substance by the aid of re seemed a possibility of an easy synthesis of colour he rosaniline series. Unfortunately, here also, after abour it has not been found practicable (though pro- D.R.P. Nos. 16,710, 16,750, 16,766, 16,707), to the technical and chemical difficulties to such a would allow these processes to compete with the sual methods for the production of fuchsin, while uite solitary cases are colour-stuffs found in com- hich have been produced from paranitrobenzaldehyde ls, and even then they have been actually formed he medium of paranitrobenzyl chloride.

in general appear doubtful whether an industry can successful which depends upon the utilisation of an bly arising secondary product, but doubtless there this case be some means devised amongst the multi- yestuffs to find an outlet for paranitrobenzaldehyde. n chemical grounds can any reduction in the cost of ocinnamic acid ether be expected, as the prices of materials coming into requisition in this process of n are now at their lowest level, and that they cannot ed to recede much further is shown by the fact that leries, even when carefully worked, show only a profit, and that many gasworks with less favourable for transit often already consume their tar underneath rts.

(To be concluded in our next.)

OME CHEMICAL PATENTS OF 1886.

II.

omplete specification of a process for purifying wool iled on January 8, 1886, from which it appears that rated fat obtained from wool-washing waters is l from the liquid and treated with solvents. Two f solvents may be used—1st, those such as benzene, solve both fats and soaps and leave the impurities or such as acetone, which dissolve the fat only. In case after solution by benzene, toluene, etc., acetone is added, by which means the soaps are precipitated. vent is distilled off from the filtrate, or from the solution in the second case, and the so-called lano- obtained by mixing the residue with water. This was taken out by C. D. Abel (No. 326) for the Chemischer Producte Actiengesellschaft, of Berlin. omplete specification of C. L. Baillard, of Rouen, him by J. V. Johnson (No. 449, January 11, 1886), the preparation of oils for use in soap manufacture, s, mordants, etc. By this process, mineral oils, s, and other similar oils are treated with various es in order to cause their *oxidation and render them* capable of saponification. Thus oleic acid, which has obsorbed oxygen from the air, or rancid fats, or chlorine acting in combination with alkalies or alkaline earth oxides may be employed. We can scarcely see the value of this process as applied to mineral oils, but if the inventor has succeeded in making petroleum oils available for soap making he has been of some use in his generation.

In Yorkshire a process for separating woollen from cotton fibres is much in use, the goods are impregnated with hydrochloric acid by which means the cotton fibre is destroyed and rendered pulverent. By patent 564, January 13, 1886, O. Chemin, of Paris, proposes to use hydrofluoric acid either in the gaseous form or dissolved in water, in the latter case the temperature of the bath being kept at 70° C.

The specification of J. Howie, of Kilmarnock, No. 616, January 14, 1886, deserves attention of all those who have quantities of sludgy materials to dry.

Messrs. Giles and Shearer, of London, in specification No. 715, January 16, 1886, describe their method of obtaining phosphoric acid in a pure state. It is herein stated that phosphoric acid may be obtained by distilling an impure acidified phosphate or phosphoric acid in a current of steam, or of the vapour of hydrochloric acid at a red heat with or without the assistance of a vacuum. The volatile impurities are said to pass over first, next the pure acid, leaving the non-volatile impurities behind.

As an instance of what non-chemical people can evolve out of their inner consciousness, we have only to refer to the specification of H. Kenyon, No. 1,016, January 23, 1886. Of course none of the reactions there described have been tried on a large scale, and unless we make a mistake, we fancy capitalists have already had quite enough of distilling coal for the sake of its products.

We now come to a batch of patents interesting to alkali makers. No. 1,048, January 23, 1886, relates to the method of obtaining ammonia and hydrochloric acid from ammonium chloride, already described on page 12 of this journal. Instead of using the nickel and other metallic oxides, a combination is employed of one of them with an acid which is non-volatile at the temperature employed, such as silicic phosphoric, boric tungstic, antimonic, molybdic, etc. By this modification the reactions are stated to be completed at a lower temperature. The patentee also states that the reactions may also be brought about by the employment of the alkaline or alkaline earth salts of the above mentioned acids.

Specification 1,049, January 23, 1886, is simply the above modification applied to the manufacture of chlorine. We do not know how these experiments are progressing, but we think the Leblanc makers need not be under any great apprehension for some time to come. We have already had much experience with the Deacon process of manufacturing chlorine, and we fail to see how this nickel process can even approach it, either in simplicity or cost.

W. Bramley, of Middlesbrough-on-Tees, has by specification No, 1,050, January 23, 1886, protected an invention for the manufacture of alkaline carbonates. By this process barium sulphate is first reduced to the state of sulphide by heating to redness with carbon. This is treated with hydrochloric acid whereby sulphuretted hydrogen is evolved, being collected and used for any purpose. To this solution is then added magnesia, magnesium hydrate, or hydrated magnesium carbonate, and carbonic acid is forced in under pressure, the liquid is heated and agitated, resulting in the precipitation of barium carbonate and the formation of magnesium chloride in solution. The magnesium chloride may be treated by any known method to obtain chlorine or hydrochloric acid and magnesia. The barium carbonate precipitate is acted upon by a solution of potassium or sodium sulphate during the injection of carbonic acid, whereby barium sulphate, suitable for use in the next charge, is formed and the alkaline bicarbonate. It strikes us very forcibly that a much simpler process than this will be required to compete with the ammonia process.

A soap patent, No. 1,113, January 25, 1886, by R. and J. E. Park, of Glasgow, deserves to be chronicled. Kiesel-

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III.

4. Burning the sulphuretted hydrogen, and sending the products of combustion into vitriol chambers.
5. Burning the waste gases and letting the products escape into the chimney.

And to these we must add the practice of letting the foul gases escape into the flue leading into the chimney, which is still taking place in some works. Returning now to the Twenty-third Report, we should consider the report from district No. 1 very unsatisfactory; the burning process should be no longer allowed, and the statement that the small proportion of acidity in the chimney is "due to an escape of ammonia, which neutralises a portion of the acid present in the chimney gases," shows the lax management of the works in which this takes place. In No. 2 district there appears to be some "burning" going on, but a statement on page 39 requires a little explanation. It is, that 18,500 tons of coal are carbonised per annum, and "the quantity of gas passed through these scrubbers per day varies from 800,000 to 900,000 cubic feet;" we would have thought the variation would have been very much greater than this. Mr. Ballard's report of district No. 3 is very interesting and instructive, and to the point, but we do not see why, if some manufacturers are made to put up oxide purifiers, all should not be treated alike. Mr. Ballard writes—"Many very small works continue to burn the sulphuretted hydrogen under the boiler fires, and for such works this method of dealing with it is as good as any." We are sorry we cannot agree with him. District No. 4 is reported on by Mr. R. F. Carpenter, and his report upon the various processes is very complete from a practical point of view; but as he has given so many figures we find a further criticism of his report is thus rendered possible, and we shall return to it on some future occasion. Mr. Carpenter's and Mr. E. Jackson's districts seem to be the best organised in the whole country.

In Mr. Fryer's district no statistics are given to show how many works are still burning the waste gases.

Correspondence.

DOES THE FAULT LIE WITH THE MANUFACTURER?

To the Editor of the Chemical Trade Journal.

Sir,—In your issue of the 23rd of July last, your correspondent "Menenius," in endeavouring to controvert some remarks made by Sir Frederick Abel, tries to throw the onus of the present situation upon the English manufacturer. For my own part I cannot see that he has proved his point, except, perhaps, to his own satisfaction, as some of the instances he has himself given tell strongly against him. "Menenius" should know, as he seems to be connected with the steel trade, that the English steel manufacturers still lead the van, and that for some years past they have, in most cases, engaged the services of qualified chemists, whenever they could be obtained. I suppose "Menenius" will agree with me that chemists who technically understand steel and iron are scarce—in fact from my own personal knowledge I would say that the manufacturer has often to take a lad fresh from school, knowing only the elements of technical work, and directly this *chemist* has acquired sufficient technical education to enable him to be useful elsewhere he leaves and certain information leaves also at the same time. This is the most annoying thing for manufacturers who, like myself, try to keep up with the times, for no sooner is the confidential chemist useful to you than he is off. Germans, however, do stop longer in situations as a rule than Englishmen, and they are not always badgering you for an increase of salary as the latter are, this no doubt has a very important influence with payers of wages. My own notion of the whole business is that the cause of the present depression is owing to the miscellaneous character of those in whose hands most of the business now rests. Men are to be found in the chemical trade who have failed at everything else they have attempted; as a last resource they have commenced to manufacture chemicals, and as they have generally no help, being their own managers, chemists, salesmen, and often bookkeepers it is not surprising that they soon get into the hands of the pawnbrokers. In my humble opinion it is a good thing that it is getting more and more difficult for impecunious men to enter into a business of any kind. I for one do not believe in all this gush about technical education; it is certainly more difficult to make both ends meet, to say nothing of profit, now that we have technical schools up and down the country than it was thirty years ago, when nobody thought of going into the chemical trade without he had received a good chemical education.

Where I think the English manufacturers are to blame—and here I may be at one with "Menenius"—is in not conducting their processes more secretly. "Menenius" incidentally refers to this by stating that certain works do not allow visitors to go through.

It will have been noticed that at the last annual meeting of the Society of Chemical Industry in Manchester it was only Englishmen who were willing to throw their works open to visitors, you did not catch the ammonia-soda people at Northwich throwing *their* works open, or Mr. Levenstein showing how aniline colours were made, or Mr. Hohenhausen letting the whole of the chemical profession into the secrets of the manufacture of dyers' chemicals, or even the Clayton Aniline Company acting as showman over their extensive works. No! they know a trick worth two of it, and the lesson they have taught should be well taken to heart by all British manufacturers.

I will not further take up your valuable space, but I say distinctly that "Menenius" has not proved his point.—I am, &c.,

A MANUFACTURER.

[We do not think our correspondent is quite correct in his remarks in the last paragraph but one. Two of the works which were thrown open can scarcely be called English, *viz.*, those of Messrs. Kerr and Hoegger and the rubber works of Mr. Isidor Frankenburg, both of which were much enjoyed by the visitors, especially the latter, as we believe a work of this kind has never been thrown open in a similar manner in this country before.—ED. *C.T.J.*]

CHEMICAL MATTERS IN THE LAW COURTS.

To the Editor of the Chemical Trade Journal.

Sir,—The leader in your issue of July 30 contains much food for reflection on the part of chemical manufacturers. I quite agree with you that it is a senseless proceeding to take any matter of a scientific character into the law courts as they are at present constituted. No one with any sense would go to a shoemaker to have his watch repaired, or to a jeweller for a pair of boots, yet it is an analogous process to this we are blindly following at the present time.

Anyone who, like myself, has had a taste of law will, I am sure, not have formed a good opinion of it, and will for ever afterwards keep away from it if he is able. My own experience, extending over many years of business, is to the effect that you may have plenty of law, but little justice appears at the end of it; for if you win you are called upon to pay large sums which can never be recovered, so that it would be far better to settle all differences at the outset. Of course we must not forget the natural antagonism of two litigants and their usual obstinacy, but I feel sure that as a rule each one only requires what is morally and legally right.

If the settlement of chemical trade disputes could be effected by a simple arbitration, we should have achieved much, and by "a simple arbitration" I do not mean that clumsy method, that expensive method now known by that name. I do not see why in the settlement of these disputes, barristers and solicitors should not be dispensed with altogether; if the matter is purely legal, why, let it go to the law courts, but if it is entirely technical or commercial, keep it as far away as possible.

This is a matter I think the Institute of Chemistry m[illegible] well take up; it has done nothing yet save gather in [illegible] scriptions—it has slumbered long enough—and if it [illegible]

[illegible] to protect its members from the imputation of the [illegible] profession, the executive would earn the [illegible] interested.—I am, &c., COAL TAR.

To the Editor of the Chemical Trade Journal.

Sir,—After perusing your article on this subject in last week's issue, I wish to ask your readers whether it is not possible to formulate some scheme, whereby the present unsatisfactory mode of procedure could be superseded.

In cases involving scientific reasoning, combined with commercial transactions, why should not each side agree to appoint a scientific man, conversant with the details of the subject; these two, when appointed, to themselves agree as to the appointment of a good commercial man to preside at their conferences. These would form the committee of inquiry.

Now, as to the method of receiving evidence I would make a very radical departure from the present mode—the plaintiffs should send in a statement of their case in writing, sending a copy to the defendants; the defendants should reply to it also in writing, and these documents should be considered by the committee.

No doubt the committee, after perusal of the statements of the plaintiffs and defendants, would desire some further information which they should ask for and obtain in writing, and I have no doubt that after the receipt of this they would be able to give a correct and just award.

For my own part I believe that this method would not be one-tenth part as costly as the present method, and as I understand that you number amongst your subscribers the head men of all the tribes, I should be pleased to hear what they think of my proposal.—I am, &c., EXPERT.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

IX. THE ANILINE COLOUR INDUSTRY.

FROM a scientific point of view the exhibits of chemical research exhibited by Drs. Griess and Perkin should rank first, as they show what the aniline colour industry was in its infancy. Dr. Perkin was the discoverer of the first coal-tar colour, mauve, and the originator of the industry in this country. In his exhibit, No. 747C, there is a sketch of the first coal-tar colour works, erected in 1858, where mauve was first made, and the first aniline printing colour, known as Perkin's green, was first produced in quantity. Dr. Perkin has always kept himself in touch with every branch of the colour industry, and whatever new colour or new preparation has been brought out, Dr. Perkin's name may be found associated with it in some form or another. We do not go so far as to say that all Dr. Perkin's processes, whether they have been patented or not, have been commercially successful ones, but it shows how the spirit of research is engrafted in him, when he endeavours to build up these compounds in his own way and to work out their constitution from purely theoretical grounds. We wish now only to call attention to what may be strictly termed the aniline colours, but Dr. Perkin's connection with the coal-tar colour industry does not rest here. He has had experience with the anthracene colours, as well as with the intermediate products of artificial indigo. In another article we shall have to describe these colours more minutely, but it is our intention to treat only on those brilliant dyes which result from chemical reactions on the benzene series. In this connection, also, Dr. Peter Griess' name becomes prominent, and in Case 741B there are specimens to be found illustrating the discovery of the diazo and azo compounds, which produce colouring matters.

At 732, Messrs. Brooke, Simpson and Spiller Limited show a very good collection of the aniline dyes, as well as the chem[illegible] from which they are made, and they also exhibit a [illegible] dyed and printed patterns on silk and other fabrics [illegible] ous applications of the said dyes. Messrs. [illegible] uguenin, of Basel, have also a good display of [illegible] applied to the dyeing and printing of wool, [illegible] Patterns are also exhibited to show the [illegible] colours on the fabrics named, while special colours are exhibited for use on leather. An old-established aniline colour works may be found at Milnsbridge, near Huddersfield, and products from this establishment are exhibited at Stand 737. The colours which are here shown are of the more common kind, such as the soluble blue, violet, etc., and we have failed to find any evidence of the most recently introduced colours. The Manchester Aniline Company (Charles Truby and Co.), whose works were established in 1873, have a very interesting case of exhibits at Stand No. 738, where there are many intermediate coal-tar products, the aniline colours produced from them, and the general run of chemicals used by calico printers and dyers employing the aniline colours for these purposes. The St. Denis Dyestuff and Chemical Company Limited, of St. Denis, near Paris, exhibit also a case of colouring matters derived from coal-tar and allied products; they also exhibit specimens of textile materials showing the result obtainable on cotton, wools, and silk, by the aid of these colours. At Stand No. 743 a very good collection of coal-tar colours is exhibited by the Society of Chemical Industry in Basel. There may be found the aniline colours, and those from naphthalene, resorcine, and anthracene, and a very good collection may here be found of the various raw and intermediate products. Messrs. Sadler and Co., of Middlesbrough, exhibit at Stand No. 744 various aniline colours, but as alizarine is their principal exhibit, we must reserve further mention until we have reached the subject of anthracene colours. A very effective case, and one calculated to catch the eye of the calico printers, is that of Messrs. Levinstein and Co., at Stand No. 742. This exhibit is an excellent display of colour, grouped in the best manner, though we think sufficient prominence has not been given to the dyes themselves.

The manufacture of the aniline colouring materials is a very interesting one, and much information on this subject may be found in the Cantor Lectures of the Society of Arts, delivered some years ago by Dr. Perkin. At the last annual meeting of the Society of Chemical Industry in Manchester, Messrs. Charles Truby and Co. allowed the members to visit their works (The Manchester Aniline Works), and two distinct parties were shown over. We believe this is the first time that any aniline works have been thrown open to the scientific public, and the variety of processes carried on therein seemed to be very interesting to the visitors. In the first instance, benzene is rectified in such a manner that it runs from the still in a state of absolute purity. Toluol is also similarly refined, as well as naphthalene and other intermediates. The secret of successful work in this branch is the careful study of the principles of chemical engineering; these raw materials are expensive substances, and cannot be treated in such a loose manner as most of our raw materials are, which are used in the heavy industries of Great Britain. Benzene at three shillings and sixpence per gallon is a very different thing to limestone or iron ore at ten shillings per ton, and any waste which takes place in such a manufactory would soon convert a large profit into an immense loss. The same may be said of all other substances used in the aniline colour manufacture. Moreover, in those manufactories in which organic compounds are concerned, we have to deal with secondary products almost entirely unknown to those whose daily business it is to deal with mineral substances, and the greater or lesser quantity of these secondary materials is an important factor in the commercial success of any of these processes. We have a very important instance of the truth of these remarks in the manufacture of colours from benzene. The aniline colour industry has always been a growing one, and the production of benzene has been nearly always about equal to the demand. The greater portion of benzene is produced during the six winter months, and the lesser quantity produced during the summer months gives the trade an opportunity of recovering from the apparent glut. This benzene trade, by reason of circumstances, has always been more or less in the hands of speculators, and if there was any opportunity of running up the price, such opportunities were never lost. It thus came about that in 1882 the speculators got hold of all the benzene they could lay

their hands upon, the result being that 90 % benzene went up to fourteen or fifteen shillings per gallon, making enormous differences in the cost of production of the aniline colours.

It was well known that the theoretical yield of the various colours was by no means perfect, and investigations were soon set on foot in order to find out whether these yields could not be increased. The results far exceeded the expectations, and consequently the cost of production of many of the colours has been very much reduced, and although the colour factories were not able to charge a proportionately increased price for their articles when benzene was high, they have been able to very materially reduce the selling price now that benzene is low.

It has been said by some that the aniline colours are going out of fashion, but this is scarcely correct, as we have it on very good authority that the aniline colourworks are even busier than they have ever been before. The use of artificial colouring matters is daily extending, but of course it cannot be expected that the existence of the naphthol and anthracene colours will be without influence on the anilines; each must have its due share in the general demand, and public taste is now running upon less fiery shades than were in vogue twenty years ago. It is in this direction that the aniline colour manufacturers must endeavour to run; they must endeavour to tone down the brilliancy of their dyes so as to give a more solid effect, but in the mean time the public taste will not tolerate such excessive brilliancy which, though it served well as an introduction for these colours, will not do so any longer, when a quieter effect and a more lasting character is required. A glance through all the exhibits of aniline colours at the Royal Jubilee Exhibition will show that this is what the modern manufacturer aims at, some of the older colours (such as mauve and magenta) have largely gone out of use on account of their too glaring nature, and some of the newer ones have been so toned down as to be less obtrusive. This has been done in many instances with the help of derivatives of naphthalene, which in themselves stand in an intermediate position to the anilines on the one hand, and the alizarine colours on the other. As a practical outcome of the foregoing remarks we may refer to the case of Messrs. Brooke, Simpson, and Spiller, and to the exhibits of Messrs. C. Truby and Co., in which the following aniline and naphthol dyeing materials are to be found.

(To be continued.)

Notes and Queries.

PETROLEUM FIRE AT BAKU.—A telegram from Baku states that the naphtha fires have been extinguished. Some 2,000 poods of oil were burnt in one reservoir, and the total loss of stored oil is estimased at 1,000,000 poods.

SINGULAR DEATH OF A MANUFACTURING CHEMIST.—Mr. S. Smelt, deputy city coroner, held an inquiry on the 29th ult. regarding the death of Arthur Smith, manufacturing chemist, late of Blackburn-road, Haslingden. On the 1st of June two men in the deceased's employ were emptying a cask containing chloride of zinc with a syphon. The syphon got choked up and the deceased lifted it up to examine it. Directly he had taken it in his hands the chloride of zinc spurted out over his face and into his mouth. His throat became very much swollen, and he gradually grew worse and died on the 25th ult. A verdict of accidental death was returned.

THE TAR PRODUCTS MARKET.

VALUES of all products remain practically the same as last week. Producers do not seem willing to sell at lower prices, and are consequently holding. 90's benzol stands at 3s. 2d. which the makers ask, to 3s. 1d. which the buyers offer, while 50's benzol could, we believe, be bought for 2s. 5d. Anthracene is still 1s. 3d. for A quality, and 1s for B. Carbolic acid is fetching 3s. 3d. for 60's. Creosote is scarce, the "Luminator" and other lights having absorbed so much, and no doubt this new demand will be more telling as the winter proceeds. Pitch has still a bad outlook for the coming shipping season, and, in the opinion of those best calculated to know, it is not likely to improve in price. Judging from all appearances, there will be about 7 per cent. more tar produced this year than last, and what with the quantities still put into the market by carbonisers, we do not see how benzol can hold its own. In fact there is as much being produced now as there was when 90's was selling at 1s. 6d., so if there was over-production then, there must be over-production now.

THE SULPHATE OF AMMONIA MARKET.

WEDNESDAY.

THE sulphate market is very firm, and prices are rising. Hull is quoted at £12. 17s. 6d. and London at £12. 15s., while, strange to say, Beckton quotations still remain at £12. 10s. Leith is quoted at £12. 12s. 6d., and even higher, though it is very uncertain how much can be depended upon in the immediate future from this port. The complications in the oil districts still continue. Last half-year Hamburg mainly drew her supplies from Leith, but whether this will be the case during the next few months it is hard to say. It is to be hoped manufacturers will not commit the error of last year, by selling forward at any prices which may be offered. The demand is certain if makers will only wait for it, and they will not cause an ounce more to be used by taking a low price, as such parcels will only be held in store in order to bear the market when the proper time arrives.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

10260. CARL KOLBE. Improvements in the manufacture of salicylic esters, called "Salols." July 22.

10295. CHARLES WIGG. Improvements in obtaining ammonia and carbonic acid from the residual chloride liquors of the ammonia alkali process. July 23.

10305. ELIZABETH HARRIOTT HUTCHINSON. Improvements in compressing sea-salt and chemicals having the same properties, and apparatus thereof. July 23.

10306. ELIZABETH HARRIOTT HUTCHINSON. An improved method of compressing solid and liquid disinfectants, and apparatus thereof. July 23.

10307. PERCY BATESON and MATHIAS CHRISTIAN. Improvements in apparatus for the manufacture of bicarbonate and carbonate of soda by the ammonia-soda process. July 23.

10309. JOHN HANSON. Improvements in apparatus to be used in the generation of gases for disinfecting or deodorising. July 23.

10324. WM. MATTHEWS. Improvements in the manufacture of Portland cement. July 23.

10329. THOMAS BAYLEY. Improvements in the treatment of waste acid. July 25.

10346. JOHN F. PEASGOOD. A specially pure and acid vinegar. July 25.

10350. MAX GEHRE. Improvements in or relating to apparatus for regulating the superheating of steam. July 25.

10385. EDUARD LARSEN. Improvements in the manufacture of slag, cement, and in the preparation of raw materials used therefor. July 26.

10458. JAMES T. GRIFFIN. The manufacture of soft or spongy material from rubber compound. (Complete specification.) July 27.

10512. JOSEPH STEWART and THOMAS CHARLTON. Improvements in and means or appliances for storing volatile or inflammable liquids. July 28.

10518. JAMES NICHOLAS and HENRY H. FANSHAWE. Improvements in the manufacture of explosives. July 28.

OUR PRICE CURRENT.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

		£	s.	d.
Acids:—				
,, Acetic, 25 °/₀	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6¾
,, Arsenic	per cwt.	0	13	10
,, Chromic	per lb.	0	0	8
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.,	per bottle	0	0	6
,, ,, (cylinder) 30° Tw.	,,	0	2	6
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4¼
,, Sulphuric (fuming 40 °/₀)	,,	12	0	0
,, ,, (Brimstone 168°)	per ton	4	5	0
,, ,, (Pyrites 168°)	,,	3	10	0
,, ,, (spent oxide 168°)	,,	4	0	0
,, ,, (,, 150°)	,,	2	5	0
,, ,, (Pyrites 150°)	,,	2	0	0
,, Tartaric	per lb.	0	1	7½
Arsenic, white powdered	per ton	10	15	0
Alum	,,	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3½
,, = 24°	,,	0	0	1⅞
,, Carbonate	,,	0	0	3½
,, Muriate	per cwt.	1	2	6
,, ,, (sal-ammoniac)	,,	36/- & 34/-		
,, Sulphate (grey), London	per ton	12	17	6
,, ,, (grey), Hull	,,	12	15	0
Aniline Oil	per lb.	0	0	10½
,, Salt	,,	0	0	9
Antimony	per ton	38	0	0
,, (tartar emetic)	per lb.	0	1	2
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	3	10	0
,, Sulphate (native levigated)	,,	3	10	0
Bleaching Powder, 35 °/₀	,,	7	15	0
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	13	0	0
Coal-tar Dyes:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
Coal-tar Products:—				
Anthracene, 30 °/₀ f.o.b. Goole,	per unit per cwt.	0	1	3
Benzol, 90 °/₀ ,,	per gallon	0	3	2
,, 50 °/₀ ,,	,,	0	2	6
Carbolic Acid (crystallised 35°)	per lb.	0	1	2
,, (crude 60°)	per gallon	0	3	3
Creosote (ordinary)	,,	0	0	1¾
,, (filtered for Lucigen light)	,,	0	0	2½
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	1	3
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston	,,	0	13	6
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	39	18	9
,, Sulphate	,,	13	17	6
,, Oxide (copper scales)	,,	36	10	0
Glue	per cwt.	1	17	6
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	53	0	0
Iron (turnings)	,,	1	13	0
,, Peroxide (blue billy)	,,	0	7	0
,, ,, (bog ochre)	,,	1	13	0
,, ,, (precipitated	,,	3	0	0
Sulphate (copperas)	,,	1	2	6
Sulphide (antimony slag)	,,	1	0	0
sheet) for cash		13	10	0
cetate (white)	,,	26	5	0
,, (brown)	,,	18	10	0
trate	,,	22	10	0
Lime, Acetate (brown)	per ton	9	17	6
,, ,, (grey)	,,	14	0	0
Magnesium (ribbon and wire)	per oz.	0	2	6
,, Chloride	per ton	2	5	0
,, Carbonate	per cwt.	1	17	6
,, Hydrate	,,	0	10	0
,, Sulphate (Epsom Salts)	per ton	2	10	0
Manganese Sulphate	,,	19	10	0
,, Borate	per cwt.	2	5	0
,, Ore, 70 °/₀	per ton	2	10	0
Methylated Spirit, 60° o.p.	per gallon	0	2	4
Naphtha (Wood), Solvent	,,	0	4	0
,, ,, Miscible, 60° o.p.	,,	0	5	4½
Oils:—Castor	per cwt.	1	4	6
Cotton-seed	per ton	21	10	0
Linseed	,,	23	0	0
Lubricating, Scotch, 885°—890°	,,	5	17	6
Petroleum, Russian	per gallon	0	0	5½
,, American	,,	0	0	5¼
Silver (metal)	per oz.	0	3	8 5/16
,, Nitrate	,,	0	2	8
Starches:—				
Sago	per cwt.	0	8	9
Potato (farina)	,,	0	10	3
Sodium (metal)	per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀	per ton	5	7	6
,, ,, (Caustic Soda-ash) 48 °/₀	,,	4	0	0
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	5	0
,, ,, (Soda Crystals)	,,	2	11	3
,, ,, (Crystal Carbonate)	,,	5	6	3
,, Chlorate	per lb.	0	0	7½
,, Borate (Borax)	per cwt.	1	10	0
,, Bichromate	per lb.	0	0	3¼
,, Hydrate (74 °/₀ Caustic Soda)	per ton	8	3	9
,, ,, (70 °/₀ Caustic Soda)	,,	7	12	6
,, ,, (60 °/₀ Caustic Soda, white)	,,	6	15	6
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	5	0
,, Bicarbonate	,,	6	5	0
,, Hyposulphite	,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	8	9
,, Silicate (glass)	per ton	5	10	0
,, ,, (liquid, 100° Tw.)	,,	4	7	6
,, Sulphate (Salt-cake)	,,	1	4	0
,, ,, (Glauber's Salts)	,,	2	2	6
,, Sulphite	,,	5	17	6
Potassium (metal)	per oz.	0	3	10
,, Bichromate	per lb.	0	0	4½
,, Carbonate, 90%	per cwt.	0	19	0
,, Chlorate	per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash)	per ton	23	5	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 °/₀	per ton	11	0	0
,, Muriate, 80 °/₀	per ton	9	0	0
Strontium Hydrate, 98 °/₀	per cwt.	10	0	0
Sugar, Beet	per cwt.	0	12	6
,, Cane	,,	0	16	3
Sulphocyanide of Barium	per lb.	0	0	6
,, Ammonium	,,	0	0	9½
Sulphur (Flowers)	per ton	9	5	0
,, (Roll Brimstone)	,,	5	10	0
Superphosphate of Lime (28 °/₀)	,,	2	0	0
Tallow	,,	30	0	0
Tin (metal)	,,	104	0	0
,, Crystals	per lb.	0	0	7
Zinc (Spelter)	per ton	14	12	6
,, Chloride (solution 96° Tw.)	,,	5	15	0

SATURDAY, AUGUST 13, 1887.

HE EXPLOSION OF PICRIC ACID AT CORNBROOK.

COL. MAJENDIE'S EVIDENCE.

Coroner's inquiry as to the death of James Martin, man in the employment of Messrs. Roberts, Dale, and hemical manufacturers, Cornbrook, who was killed by plosion there on the 22nd June, was concluded on ay, the 4th inst., before Mr. Sydney Smelt, deputy roner. For the convenience of the Court, the sitting the Sessions Court, Minshull street. Mr. Yates repre- Messrs. Roberts, Dale, and Co.; Mr. J. B. Edge ted for Mr. Reilly, proprietor of Pomona Palace, premises were damaged by the explosion; and Mr. Cooper for Messrs. R. Howarth and Co., whose mills opposite side of the river also suffered considerable Colonel Majendie, Her Majesty's Chief Inspector of ives, was present, and said he had made inquiries into se of the explosion at the request of the Mayor of ester and by order of the Home Secretary. He had ery assistance from Messrs. Roberts, Dale, and Co. quiry had necessitated a great deal of labour and a number of experiments. There were three events to ounted for—the fire, the first minor explosion, and the or main explosion. As regards the fire, he found originated in or at the stove, and was in the first ce mainly a fire of picric acid, which rapidly spread. was nothing in the manufacture or in the nature of the nces on the premises which would account for the out- of the fire. But undoubtedly the fire was the origina- use of the whole disaster. First, as to the minor ion, which accurred some minutes after the fire was ed. There were two points perfectly clear about that ion. The first was that it occurred in the stove, and cond was that it did not cause either of the two large which he believed the jury had seen. The first of points was established by the fact that there was no sion of the bricks of the stove, showing that the stove, was close to the big crater, could not have been stand- the time of the main explosion. An explosion which have produced either of the craters, or anything like must have been of a most formidable character and ed with considerable local destruction. But there was g of the sort in connection with the first explosion. regard to it there were three possible causes. It might een due to the bursting of the steam pipe in the stove; ht have been due to the explosion of some substance t in the stove, or formed during the fire; or it might een due to an explosion of picrate of lime formed by the acid and the lime in the mortar. Such an explosion ccurred in this country in a factory where picric acid eing manufactured. But so far as the main explosion oncerned, it was a matter of comparative unimportance at particular cause the first explosion was due, because was no necessary connection between the two explo- The craters on the works undoubtedly marked where ain explosion occurred. Although there were two s, he thought it would appear that there was a simul- s explosion at each point. He did not want to occupy n discussing theories which had been examined by him missed as untenable; but he ought to say that he had attention so far as he knew to all possible explanations explosion, and notably to the suggestion that it was sewer gas or accumulations of volatile matters under- d. Such explanations of the explosion were in his absolutely untenable. The explosion, therefore, was by something above ground. Now the craters were arge, and represented, each of them, a force of probably s than 400 or 500 pounds of gun cotton. Craters very em had been produced at Eastbourne with 500 pounds cotton. The point was what had produced them in se. He had been assured positively by Messrs. ts, Dale, and Co., in *reply to repeated inquiries*, that they did not knowingly manufacture any explosives on the premises. Therefore he had to consider what was present on the premises.

The Coroner: There could not have been a very large quantity of any explosive accumulated on the premises without being seen by the workmen.

Colonel Majendie said that that had affected his mind in the conclusion he had come to. The first thing to be looked at with suspicion was the picric acid, and the obvious question with regard to it was—could it be exploded by the action of fire? As to that, the books undoubtedly said that it could, even when unconfined. But experience said the contrary. Dr. Dupré and Sir Frederick Abel, along with himself, had tried without success to get an explosion of picric acid by fire; and, on the other hand, he had obtained evidence of large quantities of picric acid burning away without explosion. In the history of accidents from this substance there was, he believed, only one case of a suspicious character, and as that case bore a somewhat remarkable analogy to the present case, he might mention it. It occurred on 7th June, 1882, at the Heron Chemical Works, Lancaster, and it appeared that there, as at Cornbrook, there was first a fire; then, after an interval of about fifteen minutes, a small explosion; and almost immediately afterwards a big explosion, which occurred in the stove. The inquiry in that case brought out that the first explosion was due to the bursting of a steam pipe. The cause of the second explosion was not definitely ascertained, but it was extremely probable from all the circumstances that it was caused by picrate of lime formed during the fire in the stove. At any rate, that was the nearest approach to a suspicious case of an explosion of picric acid *per se* by ignition that he had been able to come across. But although picric acid apparently did not explode by ignition, at any rate in moderate quantities, such as they were dealing with in this case, it could be detonated in the same way as gun cotton, dynamite, or other high explosives, by means of a fulminate detonator—that was to say, a detonator charged with fulminate of mercury. That fact had long been well known. Attention was called to it by Springhill in 1873, and in 1885 a patent was taken out for utilising picric acid for explosive purposes by that means. He had made a number of experiments on this point. He found, first—and he was obliged to insist strongly on this because it had an important bearing on his conclusions,—that picric acid in its ordinary form as it existed at these works could be detonated with so small a detonator as five grains of fulminate of mercury. Secondly, he found that even if a space were left between charges of picric acid the detonation of the one would develop the detonation of the other. And thirdly, he found that picric acid, even when wet—he had gone to 17 per cent. of water—could be detonated by a detonator of dry picric acid in contact with it. Still that left them without any explanation of an explosion due to fire alone, and it was therefore necessary to examine carefully the behaviour, or possible behaviour, of the substances which were present in the immediate neighbourhood of the stove and craters. He had accordingly, with the assistance of Dr. Dupré and Sir Frederick Abel, carried out a number of experiments with these substances—namely, picric acid, litharge, nitrate of lead, and nitrate of strontium, all of which Mr. Dale had stated were present in this part of the factory. At an early stage of their experiments they found that if a little litharge were brought into contact with picric acid so as to form the crudest possible mixture—something hardly to be called a mixture at all,—it could be detonated by heat with tremendous effect. He had brought with him to the court some of the dishes on which these explosions had been effected. Colonel Majendie exhibited to the jury a number of small tin plates grievously torn and twisted, remarking that the explosions had been effected with no more than three or four grains of the mixture. There could therefore, he said, be no doubt as to the violently explosive character of the combination. Similar effects, but of a less violent kind, had been obtained by mixture of picric acid and nitrate of lead, and picric acid and nitrate of strontium. The experiments were continued at Woolwich Arsenal

with larger quantities of the mixtures, and he produced examples of the effects obtained. But two other points remained. First, if a small quantity of a picrate detonated in a mass of picric acid, would it explode the mass? And second, could such a picrate form itself in the course of a fire? In regard to these points he would describe an experiment which had carried complete satisfaction to his mind and the minds of the scientific gentlemen associated with him. The experiments were made last week at Woolwich Arsenal, and the picric acid used was some which had been purchased from Messrs. Roberts, Dale, and Co. Ten pounds of this picric acid was taken, and first of all a thinnish layer of it was spread on the bottom of a tray. Then half a pound of litharge was sprinkled on the layer of picric acid, and on the top of the litharge was put the remainder of the ten pounds of picric acid. The tray was then placed over a spirit lamp resting on some bricks, and the spirit was lighted. The first experiment was unsuccessful, owing to a high wind blowing the spirit too much on one side, so that the picric acid was not ignited. The experiment was repeated, and this time with perfect success. The picric acid ignited and burned with its characteristic inky black smoke for 1¼ minutes, then went off with a detonation of surprising violence. Immediately before the explosion streaks of smoke of a lighter colour were observed through the black smoke, leading to the conclusion that the litharge was catching fire. But hardly was the lighter smoke seen than the explosion occurred. This experiment, he thought, furnished a complete explanation of the Cornbrook explosion. The circumstances connected with the experiment repeated some of the facts observed at the Cornbrook explosion. Directly after the experimental explosion was over he observed that the grass had been set on fire in all directions over a radius of something like 70 yards. This closely corresponded to what happened at Cornbrook, in the fires which broke out at different places on the buildings of Pomona Palace. The experiment showed beyond all question that if a quantity of picric acid was in contact—it was not necessary that it should be mixed—with a very small quantity of litharge, and they were subjected together to the action of fire, a detonator was formed in the shape of a picrate, the detonation of which did for the mass exactly what the detonation of so much fulminate of mercury would do—that was to say, it would explode the whole. He therefore felt warranted in reporting to the Secretary of State his opinion that the main explosion, so far as the big crater was concerned, was due to the formation in the course of the fire of such a picrate detonator as he had been describing, and that the fire as it proceeded had detonated it with all the picric acid in contact with it. But there were two craters. A crystallising stone containing about 130lbs. of picric acid stood where the second crater was formed, and his experiments had shown that wet picric acid could be detonated. And it was a well-known fact that a considerable space might intervene between a powerful detonation and another mass which was to be detonated. He had no doubt in his own mind that an explosion of the extremely formidable character which took place over the first crater produced an explosion of the picric acid in the crystallising stone over the second crater. The fact that there was water present did not disturb that conclusion. On the contrary, the presence of the water would undoubtedly tend to intensify the explosion, just as wet gun cotton was used as more effective than dry gun cotton for torpedoes and other uses. His conclusion, therefore, was that the two craters were produced simultaneously—the first through the agency of the self-formed picrate detonator, the second from the sympathetic detonation of the picric acid over the second crater. There was another point. The plan of the works giving the position of the different substances did not show any picric acid or litharge on the site of the big crater, He was of course unable to say what was there, and the witnesses might have been mistaken in saying that these substances were not there. But even if the witnesses were not mistaken, even if as matter of fact there was none of the stuff there at the commencement of the fire, it was perfectly conceivable that it *arrived there in the course of the fire.* There were three reasonable explanations of its getting there. First the first minor explosion might have tumbled it do the ground fell in that direction; or, as the picric acid it would fuse and the stream of fused picric acid naturally flow in that direction, and accumulating i depression in the ground or about some obstacle, furnish the material, with its small dose of litharge, main explosion; or, lastly, and as seemed more prob him, the deceased man, passing out of the facto observing the flames issuing from the stove, might ha a shove to the two barrels of picric acid that were in the burning stove, with the intention of at any rate them. If so shoved, the two barrels would naturally the direction of the crater; and possibly the firs explosion completed what the man began, and s barrels quite down to the second crater. Any one c explanations was perfectly reasonable. His conclus that, whether by being there originally or by being r there by one of the causes he had suggested, there that point a considerable quantity, probably some 30 400lb., of picric acid, with its detonative dose of litha it might be of nitrate of lead, or even of nit strontium,—which produced the explosion of the whol

The Coroner: Picric acid is not one of the ex mentioned in the Explosives Act?

Colonel Majendie: No.

The Coroner: Has anything been done by the S of State with a view to getting picric acid included in t

Colonel Majendie said the view they had alway upon at the Home Office was that certain named sub among which picric acid was not, were explosives no for what purpose they were made, and that other sub though of an explosive character, were not regar explosives if not manufactured for explosive purpose example, picric acid or picrates manufactured for ex purposes or for pyrotechnic purposes would be rega explosives, but not when manufactured for dyeing pu But of course this disaster did suggest whether it mi be necessary to take advantage of the 104th section Explosives Act, and have picric acid put upon the l would be his duty to carefully consider what recomme he should make to the Secretary of State. Before giv definite decision he desired to look into the matter ve fully, because, although the first thing was of co protect the public, they must be careful that in doing did not destroy the trade or put impracticable rest upon it. The matter obviously could not rest where and it would be his duty to make a definite recommen

The Coroner said he did not think the public wo satisfied if their safety was in any way interfered w mercantile considerations. The public safety ought be subservient in any way to mercantile advantages.

The jury retired and took three-quarters of an hour sider their verdict The Foreman (Mr. John Ber announcing the conclusion of the jury, said he felt very difficult matter because of the serious results th follow. The jury found that smoking caused the fi the fire caused the explosion, that in the storage materials used in Messrs. Roberts, Dale, and Co.'s b there had not been sufficient caution, and that the d Martin was caused by the explosion. He would like that he for one would have been very glad if they coul come to a different conclusion. It seemed to the there ought to have been more knowledge, if he m speak, on the part of Mr. Dale, as the principal che such a large concern, of the materials he was dealin The jury would also like to recommend that the manu of such materials should be put under Government and carried on in an isolated place.

The verdict, as summed up by the Coroner, was:— the fire was caused in consequence of Robert Hy obeying orders and smoking on the premises; and t fire ignited picric acid and litharge, which had bee dentally mixed and fused owing to the negligent ma which they were stored, and so caused an explosi destroyed the buildings and killed the said James Mar

DEVELOPMENT AND PRESENT POSITION OF ARTIFICIAL INDIGO.

BY DR. P. FRIEDLÄNDER.

(Concluded from page 83.)

what has been said in the foregoing remarks it ppear that the chances of a successful further develop- the indigo industry from orthonitropropiolic acid at technical, chemical, and commercial grounds are ote. Taking as a basis the present level of prices, d estimate the actual cost price of orthonitrophenyl- acid to be about 8s. 2d. per lb. (dry material), hen worked on a very large scale might be reduced 7s. 6d. It must not be forgotten, however, that lic" acid is not indigo itself, and can only be trans- nto the latter by means of a special operation. The ally possible yield amounts to only 68·5 per cent., but we ought only to reckon on 50 per cent. when work- e large scale, so that the prime cost of artificial indigo be less than from twentry-seven to thirty-two shillings d. This price, of course, excludes all chances of ion with the natural indigo, and had it not been "propiolic acid" permitted of new effects in print- h with natural indigo was difficult or impossible to e fate of the new indigo industry would have been once.

ell known that the fixation of indigo on the fibre pre- siderable difficulty to the printer, as the process is only with the assistance of indigo-white, in consequence of sses in material result, while on account of the com- process, the simultaneous use of many other colours the question. In opposition to this, the use of acid for printing is very simple. According to the ts made in the fourth additional patent, D.R.P. No. the same is printed on with a xanthic acid salt with ion of a weak alkali (as for instance borax), where- igo becomes developed upon the fibres in the cold, any further operations. This simple process of limits of the simultaneous use of every other possible colour, and the easy execution of the most varying so that it would seem as if the previous processes of would meet with competition, as the question of uld be counterbalanced by the less quantity of material employed (we are treating now of light and therefore has but little weight.

are a few inconveniences of this method which might be removed on a more careful study of the atter, such as the want of fastness of the finished olour, and also the odour arising from the displace- the xanthic acid salts, which becomes easily attached aterials printed on. It seems hardly necessary to that the indigo mixture used for printing is so small ared with the collective consumption that even with usive use of "propiolic acid" for this purpose no can be expected to result upon the production of ndigo.

nd and not less extensive group of patents is based eaction discovered by Baeyer and Drewsen, and it s object the production of indigo from orthonitro- hyde and a few derivatives of the same. In our to these we can express ourselves very briefly, as them have as yet been utilised.

hief patent in this class, No. 19,768, of the 24th y, 1882, describes the formation of indigo through the orthonitrobenzaldehyde upon aldehyde, acetone, or ubstances, in the presence of alkalies. In this case ecomes either directly formed in fair quantity and in of excellent purity, or in the careful working inter- colourless products are obtained, which would allow lar easy fixing of indigo upon the fibre, as is the case propiolic acid." On account of its simplicity the deserves preference over the complicated production piolic acid," and would be eminently practical if it y possible to produce orthonitrobenzaldehyde at a le price. On this "if," *unfortunately, the* practical execution of this beautiful synthesis has been shattered. Every method practically available for the manufacture of para and metanitrobenzaldehyde fails when the ortho connection is required, and this can only be obtained by a troublesome, expensive, and indirect process. In the direct nitration of benzaldehyde there can only be obtained as a maximum 20 per cent. of the orthonitrobenzaldehyde alongside of 100 per cent. of the meta connection, and all efforts which have been made to alter this relation in favour of the ortho compound have remained (as in the case of the nitration of cinnamic acid) without success. Attention was then turned to the derivatives of oil of bitter almonds, which, upon nitration, form almost exclusively ortho connections, such as methyl-benzaldehyde (toluolaldehyde) D.R.P. No. 21,683, chlorited or brominated benzaldehyde D.R.P. 32,238, 33,064, 31,842. From these substances there is produced, however, from the Baeyer and Drewsen reaction, not indigo itself, but the corresponding derivatives of the same, methylindigo, chlor, or bromindigo, substances which in their chemical relations certainly show a great analogy with the mother substance, but which vary considerably in their tinctorial qualities, so that chlorindigo or bromindigo retain the property of requiring vat treatment, and the formation of a sulpho-acid. In the meantime these objections have not been considered, as the execution of the processes referred to has hardly gone beyond the stage of laboratory experiment, and indeed it seems to have scarcely any prospect of being worked out technically.

What has been said above applies in a still yet higher degree to a few further patents, three of which have for their object the production of indigo from orthonitrobenzyliden-ketone, No. 20,255; and from orthoamidoacetophenone, No. 21,592 and No. 23,785; while two others refer to the formation of isatinon (oxidation products of indigo) D.R.P. Nos. 25,136, 27,879 in the possession of the colour factories of the late Baeyer and Co. In the case of the three former there is at present no prospect of a technical use for the secondary products; in the two latter, the technical possibility of the transformation of isatin into indigo is not assured.

The patent literature of artificial indigo is now exhausted, and from the above remarks the probable position of artificial indigo in the future may be predicted with tolerable accuracy.

The "propiolic acid" process is no longer capable of being subjected to further development, while the remaining patented methods of production possess very small chances whatever of technical utilisation, even if it became possible to give to the paranitrocinnamic acid, through any mode of utilisation the value of the ortho connection, and by that means lessening the price of the propiolic acid by one half, the cost of production of artificial indigo would about come up to the selling price of natural indigo; but under these circumstances, the greater ease with which "propriolic acid" may be used would perhaps make up for the difference in the selling price. It is however an absolute certainty that the value of natural indigo under the influence of serious competition, is capable of a further and very important reduction, a reduction which would exclude the use of "propiolic acid" for cloth dyeing, and would limit the same to the modest sphere of printing.

According to this, it would appear that the numerous labours of Baeyer and his disciples would prove barren of results; indeed, it would seem that the great sacrifices of time and money that have been made in proving and working out these syntheses have been useless. Considered in a limited sense this is certainly so. Indirectly, however, there has hardly ever been a scientific discovery that has acted more fertilely upon the artificial dyeware industry than this; scientific research could hardly have been more actively supported than has been the case in the synthesis of indigo. Here is not the place to recount the many impulses which colour chemistry has received during the prosecution of these labours, nor the still more numerous scientific investigations which only became possible when the tar-colour factories furnished chemical laboratories with rare compounds which had hitherto been so difficult to procure. Without this

assistance, and without in any way wishing to detract from Baeyer's deserts, it would hardly have been possible in so short a time to have cleared up the constitution of indigo blue, and to have collected a number of the most important materials for examination, which perhaps will be of much use in a future synthesis of indigo.

In these labours we see illustrated in the most beautiful manner the relations which the German coal-tar colour industry has brought about to raise it to its present dominating pinnacle—the result of the mutually supporting action, and of the intimate connection between science and practice.

Romen's Journal.

ALIZARINE COLOURS IN THE HANDS OF THE PRACTICAL WOOL DYER.

BY C. ROMEN.

(Concluded from page 82.)

The Badishche Anilin and Soda Fabrik, in 1878, first recommended alizarine red instead of madder for wool dyeing. The alizarine red was followed by a series of new colouring matters of the same fastness and application which they first recommended for wool dyeing, they are :—

Alizarine orange	1879
Cœruleine	1880
Galleine	1881
Alizarine blue	1880
Alizarine maroon	1885
Alizarine red, S	1885
Anthracene brown	1886
Gallo-flavine	1886
Alizarine black	1887

All the colouring matters herein cited, present in their colourings on the mordanted fibres dyes of the utmost fastness, as regards milling, light, and acid. Amongst the most beautiful are those produced by chrome mordants, and they are the most capable of resistance. The general application of these colouring matters is now no longer interfered with, as the difficulties which originally stood in the way have been surmounted. The introduction of alizarine colours in the dyeing of wool is favoured :—

1. By the excellent qualities of the colours themselves ;
2. By the publication of excellent recipes and sample colourings on the part of the Badische Fabrik ; by the continued and untiring labours of this factory, as well as by the personal examination on the part of their own chemists at the various dyeworks ;
3. By a cheap production price of these colours upon materials of all kinds ;
4. By the simplicity and easy execution of the processes of dyeing, as well as by the fact that with the colours now made a complete circle of fancy shades can be produced, a factor which certainly must not be underrated.

Thus, it has come to pass, that the alizarine colours continue to meet with increased acceptance for wool dyeing. Certain industries of the present day cannot dispense with them any more, such as the fancy dress branch, and the carpet industry, in which alizarine has given an impetus to quite new styles. Again, modern engineering has taken this mode of dyeing patronizingly by the hand. It would be ignoring the services of Messrs Obermayer at Lambrecht, in the Pfalz, not to mention that the apparatus invented by them, and often referred to in former articles as the Obermayer apparatus for dyeing, is specially suited to alizarine dyeing, in which a longer boiling is necessary, and which in its general utility has rendered very valuable services.

Improvements in this direction have not by a long way [illegible] to a conclusion, and they will doubtless penetrate more [illegible] practice, and so carry alizarine dyeing con- [illegible] circles. At the present time, however, [illegible] aratus completely rules the ground.

[illegible] to the alizarine colours though only [illegible] neral practice for wool dyeing, the [illegible] tance which they have already attained ensures that they will yet meet with wider distribution so soon as their advantages are generally recognised.

It cannot be denied that in the entire native and foreign literature, many of the advantages of the alizarine colours have been correctly and impartially described and recognised, but in many instances they are to a great extent misunderstood. In the remarks which follow we shall endeavour to expound the errors of some of these views.

As already mentioned at the outset, the alizarine colours for wool dyeing have to enter into competition with such colours as have been domesticated for years, and their use is strongly supported by long preserved processes and methods through many generations. Our dyers are by nature conservative, our vat-dyers highly conservative.

In former articles we have offered dyers a mirror for their own personal recognition, so often that we can now spare ourselves the trouble of doing the same again, so that we may now look purely at the business side of the question.

It is quite easily explained why old processes are adhered to ; processes to which one has become accustomed, and which up to now, have rendered the necessary services. It behoves us to be careful, not to strike out into new paths, before they have been carefully examined, especially when it does not appear as clear as the sun at noonday that great advantages may be reaped therefrom. We will test these reasons as regards their impregnability, and will at once thrust at the lance-horse of the opposition, the dyeworks of vat-blue in opposition to those of alizarine blue, or indigo-blue versus alizarine.

It is generally recognised that wool, dyed with alizarine blue possesses extreme fastness, the same is in no way inferior to vat-dyed blue, but in many respects surpasses it. Wool dyed with alizarine blue, is as fast against acid and light as that dyed with indigo blue. In washing and milling, correctly dyed alizarine blue loses certainly much less than indigo blue. Alizarine blue wool does not rub off, and is therfore very favourably distinguished from vat-blue. Alizarine blue is decidedly more capable of resisting chlorine than indigo ; moreover it is universally recognised that the process of dyeing is more simple and less complicated, while the producing capabilities of a dyeing plant with alizarine blue, are greater than in the vat-dyeing process. The advantage that one can dye in one and the same bath, under equal conditions, not only all alizarine colours, but also all other colours which are dyed in an acid bath is also universally recognised as opposed to vat-blue, as is also the fact that slubbings, yarn, and cloth can be all dyed equally well in alizarine blue, while this is impossible with vat-blue.

The dyeing through of piece-goods is quite as easily practicable with the soluble alizarine blue S. of the Badische Fabrik as with any other dyeing materials, when their instructions are adhered to, while in vat-dyeing this is much less capable of being carried out. The white seams which are met with in clothes, the cloth of which has been piece-dyed in the vat, and which is recognised as being a great detriment, are never met with in cloth piece-dyed in alizarine blue.

So far the advantages are undisputed. With regard to price, the favour is claimed for alizarine blue, while by some this is disputed. Years ago when the new dyestuff was first introduced, it appeared doubtful whether alizarine blue was really cheaper than indigo ; the question is now at once answered by the very reduced price of this dyestuff, and is decidedly in favour of the alizarine colour. Opposite views have no doubt been arrived at by not following implicitly the instructions given by the Badische Anilin and Soda Fabrik. We must here state, that we have invariably in view middle and dark tones, and compare with pure vat-blue ; for light blues alizarine blue is by no means intended to compete with indigo, as in these it furnishes redder shades which differ from indigo.

We happen to know that dark blue shades properly dyed with alizarine blue have been submitted to the vat dyer for comparison with pure vat-blue of a corresponding shade, and the verdict has been invariably in favour of the alizarine blue.

This colouring matter is supplied in three distinct shades.

Three per cent. of chromate of potash and 2½ per cent. of argol are used as mordants; oxalic or sulphuric acid can be applied, but are not to be recommended. In the case of a concentrated bath 2 per cent. of chromate of potash and 1½ per cent. of argol is sufficient, while in the case of a very thin bath 4 per cent. of chromate of potash and 3 per cent. of argol are requisite.

Goods can be dyed with the new soluble alizarine blue, S.W., in any kind of vessel—wood, iron, or galvanised copper. In order not to lose colour, the mordanted wool should, by rinsing, be freed from unfixed chrome, and to the dye-bath one part of acetic acid to a thousand parts of water should be added as a corrective of the lime salts present. In the case of a very hard water it is well to raise the amount of acetic acid to two parts. As far as regards the remaining points of the process, we would refer entirely to the clear and complete instructions issued by the Badische Anilin and Soda Fabrik.

We now come to another very important point which has often been raised against the introduction of the new dyestuff, and of the alizarine colours in general, but which is equally as unjustifiable, and which can certainly only be attributable to an incorrect following of the dyeing prescriptions; it is namely this, that it is supposed that the quality of the wool suffers in the process of dyeing. It can, of course, be readily understood, that wool dyed in an acid bath will feel harsher than wool dyed in an alkaline one; it is, however, a fact that wool fibres are more attacked by caustic alkali than by weak acids such as here come into consideration. According to our experience, and the views of consumers who have for a long time adopted the alizarine colours, and who have used them on slubbings, yarn, and piece-goods, the wool through being dyed with alizarine colours loses neither in spinning or in milling capabilities, nor in firmness, so that differing results must be attributed to other causes, and one solitary case quoted by the opposite side cannot be considered as conclusive.

As a striking proof of the above it may be interesting to know that the German military authorities have already accepted sample pieces dyed with alizarine blue, and they have found that for fastness they have completely met the highest demands which had been made upon vat-blue cloths.

Even if the opponents in scientific journals assert that alizarine blue attacks the wool fibre independently of the mordant, such statements must not be taken in earnest; they point to a defficient knowledge of the chemical qualities of this colouring material. Again, to the bisulphite which is contained in soluble alizarine blue to a small extent, has been ascribed an unfavourable action, with injustice. When we consider that bisulphite is nothing more than partially neutralised sulphurous acid, which is frequently employed in a concentrated state in bleaching the wool fibres, the quantity of this acid calculated on the dye-bath is much smaller than the amount used of non-volatile and stronger sulphuric acid in the dyeing of aniline colours, consequently this assumption may be likewise contradicted.

Finally, there has been attributed to the alizarine colours the fault of unequal dyeing. If the wool or other material be sufficiently cleansed, the dyer, if he correctly follows his instructions, will never have cause to grumble of inequality of colouring. Badly cleansed goods must, of necessity, unequally absorb the mordant and with it the colour, and under these circumstances no dyestuff whatever will impart to them an equal colouring.

In literature, we meet with various dyeing prescriptions, deviating very much from those laid down by the Badische Anilin and Soda Fabrik. According to our own views none of these prescriptions offer advantages, indeed we find among them many faulty ones, which point at once to the want of knowledge of the chemical and physical qualities of this class of dyestuffs.—*Romen's Journal.*

BARGE BUILDING IN RUSSIA.

WHILE Russia is not a builder of iron vessels for sea-going, or, with rare exceptions, for river purposes, owing to the collapsed condition of the shipbuilding industries, she still turns out every year an immense number of wooden craft of considerable magnitude. If a steamer of 800 tons is a very large one for her to produce, and is only produced occasionally, she constructs every season wooden barges with the enormous cargo capacity of 8,000 tons for service on the Volga. Barges for canal purposes as small as those used in this country are scarcely ever seen in Russia. The average Russian barge conveys as much cargo as the average English coasting cargo ship. Plying regularly on the river Volga, season after season, are 3,000 permanent barges of 1,000 tons cargo capacity apiece, making a united cargo capacity of three million tons. These are very strongly built, almost clumsily so, but answer the purpose for which they are intended—to carry cargoes to the Great Fair at Nishni Novgorod, and convey others back again to the various navigable branches of the river Volga. In excess of these, 200 barges are built in the Kama and Volga every year intended only to carry goods to the destination and then be broken up, ranging in cargo capacity from 5,000 to 8,000 tons. Occasionally even barges of 10,000 tons cargo capacity are seen at the Great Fair. Such mammoth vessels are built in the autumn and winter, and float with the spring floods down rivers, unnavigable in summer, to the Volga, where they are taken in tow by steamers and conveyed to Nishni Novgorod. Their length—300 or 400 feet—unfitting them for traversing the canal system between the Volga and St. Petersburg, the locks accommodating only vessels 147 feet long, 1,000 smaller barges of 200 or 300 tons capacity are constructed specially for this purpose, being used afterwards at St. Petersburg and other towns for firewood, etc. On the Volga also the barge builders turn out 4,000 ferry barges, fishing boats, and small craft of various kinds every year. Formerly a large number of three-masted wooden vessels for the Caspian used to be built annually, but the rapid extension of the steamer service there has checked this branch of the industry. While in this country canals have long been under a cloud, in Russia the construction of railways has very little affected their traffic, and they are undergoing constant development, many of the canal systems which were originally planned by Peter the Great and struck out in his time, are now being taken in hand again and completed.—*Engineering.*

Correspondence.

THE FAULT DOES LIE WITH THE MANUFACTURER.

To the Editor of the Chemical Trade Journal.

Sir,—A manufacturer (see No. 11, p. 85) in attempting to reply to my letter on page 70 No. 9, says he cannot see that I have proved my point. The desire to see would probably much accelerate the cure of his blindness. Let me in the beginning assure him however of my sincere goodwill, for judging from the tone of his letter, he desires an improvement in the condition of English chemists as earnestly as I do, although from a different point of view.

I do know that English steel manufacturers still lead the van, and asserted the fact in my letter although not in the same words; and, I do know that many English manufacturers have engaged the services of qualified ENGLISH chemists, but I do not know that in "most cases" they have engaged the services of qualified chemists "*whenever they could be obtained;*" on the contrary, I know within my own observation of several cases where among the applicants for such posts there were one or two chemists who did technically understand iron and steel, *men of thorough scientific* (English) training besides, and yet the manufacturer selected "lads fresh from school, knowing only the elements of technical work." I certainly agree with "a manufacturer" that chemists who technically understand steel and iron *are* scarce, especially German ones; but they do not seem to me so scarce as manufacturers who prefer a really competent and valuable trained chemist at £200 to £300 per annum to a lad fresh from school at £50 to £80 per annum. True, O! manufac-

turer! *it is annoying* to find the latter do the "butterfly trick" as soon as he becomes useful to you, taking with him certain information; but if manufacturers will get services cheap and nasty, I think others besides starving chemists will agree with me in saying "sarves 'em right, they should pay him more when he is useful. Perhaps "a manufacturer" thinks £200 a year a large salary, or at any rate a sufficient salary for a thoroughly efficient chemist; but if so, I must differ with him, for I know cases where ordinary workmen—sulphate of ammonia makers, engine-tenters, etc. get more than this, aye, and pay no income tax either; nay, more, lest he should think I am misinformed, I can assure "a manufacturer" that I, even I, Menenius! at present receive less by fully £50 a year than the engine-tenter in the works, yet there is no comparison between the positions we have respectively to maintain. I may well ask myself if it was for this so much time and money was spent in my maintenance at school and at college; for this I passed examinations in the School of Mines; for this I became a F.I.C., A.R.S.M., or F.C.S., paying all necessary fees, and had ten years or more technical experience besides? In fact, did everything a chemist ought to do to prove his value. Yes, it is "All very large and fine," except the salary. And there are numbers such as I, and why? Well, one reason is because some manufacturers prefer German chemists, or lads fresh from school, at cheap rates of salary. I cannot but smile at the way in which "a manufacturer" says "Germans do stop longer in situations as a rule than Englishmen, and they are not always badgering you for an increase of salary as the latter are." Perhaps they know when they are well paid according to their abilities. Thank goodness! there are not many German chemists in English steel works, and none in the best.

I do not see "a manufacturer's" ground for saying some of the instances I have myself given tell strongly against me, and taking his letter as a whole I am inclined to think he has misapprehended what was the "point" of my letter.

"A manufacturer" is right when he says "Men are to be found in the chemical trade who have failed in everything else, etc., etc., I agree with him from this point to the end of the paragraph. These little manufacturers especially, are to be found up and down East Lancashire and the West Riding of Yorkshire, so much so that it is a saying that you can set up a chemical works with "one or two tubs, a few carboys, and a stink." I do not believe in the present system of technical education either, for I fear it is only calculated to largely increase this class of pettifogging chemical manufacturers! Already some of our new schools and colleges founded for the purpose of teaching technical chemistry, among other things are sending their half-trained youths out as—chemists—save the mark, and I see nothing for these persons to do when they find manufacturers get disgusted with them, but to commence in a very small way on their own account. I pity them for they are not entirely to blame; they know, perhaps, as much about *technical* chemistry as the learned professors who have taught them. Technical schools, so far as chemistry is concerned, would be more likely to do good service if they employed men who understood and had long experience in manufacturing chemistry, instead of having men who—this is an actual case—mistake chlorine chambers for vitriol chambers, and cannot describe in detail the phenomena which will be presented by varying the steam in a set of sulphuric acid chambers, or tell what is the cause of a white cloud on the chimney of a sulphate of ammonia works, or the way to at once remedy a brown fume in a vitriol exit; or who—another actual case—refuse to have a cast-iron receptacle for mercury on the grounds that the iron would be made rotten by amalgamation. I say beware of such "technical instructors" and fight shy of their pupils.

In conclusion, and for the information of "a manufacturer" I [illegible] my point was that German chemists are not [illegible]lish chemists, and that English chemists are [illegible]doing the work required of them if they are [illegible] I say also that the fault lies with the manu[illegible] as a lad fresh from school because he can [illegible]ges, and refuses to pay a fair salary to a properly trained and experienced chemist. "a manufacturer" has not disproved this, and indeed his first paragraph rather supports my position, for why does his chemist leave if not for more money? and why doesn't he pay him then? And again, he does not assert that Germans are better chemists, but they stop longer and do not badger him for more salary! Point indeed! If I have not proved my point "a manufacturer" has done so for me.—I am, etc.

MENENIUS.

Notes and Queries.

BAKU PETROLEUM.—A correspondent in Batoum has heard from Baku that the Messrs. Noebel have sold all their petroleum establishments to the Messrs. Rothschilds, of Paris, for a sum of 28,000,000 roubles. The same firm are negotiating with Messrs. Noebel for fixing a tube, 800 kilometres in length, intended to carry refined petroleum, with which the Baku market is encumbered, to either Poti or Batoum on the Black Sea. This would most decidedly be to form a close monopoly in refined oil.

SUGAR DUTIES.—The Government of Victoria intends raising the duty on imported cane sugar to 3s. 6d. per cwt., and on beet sugar to 6s. per cwt. The duties on dressed timbers are also to be increased.

SUBSIDENCES IN CHESHIRE.—Subsidences are again taking place in the Cheshire salt district. The cellar floor of the Wheatsheaf Hotel, Northwich, collapsed recently, and a number of beer and spirit casks were lost beyond recovery.

ALLEGED MURDER BY CARBOLIC ACID THROWING.—Henry Martin, 57, head cellarman, was indicted at the last Chester Assizes for the wilful murder of Henry Burrows, at Birkenhead. The prisoner and the deceased were employed by the Birkenhead Brewery Company, the prisoner being head cellarman and the deceased under cellarman. On the premises is a cellar approached by fourteen steps, which the prisoner and the deceased were accustomed to clean out, using carbolic acid for that purpose. The prosecution alleged that, on the 30th June, while the deceased was engaged in the cellar the prisoner, who was jealous, threw a can of carbolic acid over him. Several persons ran to his assistance, and while they were supporting him the prisoner went off, and, procuring another can of carbolic acid, came back and, with an oath, dashed the contents of the can right into Burrows's face. The deceased who, before, was dreadfully burnt, then fell back and never recovered consciousness. He died on the following day in the infirmary.

GUINNESS AND COMPANY'S DIVIDEND.—A Dublin correspondent telegraphs: It is understood that the profits of Guinness and Company, the Dublin brewers, for the nine months trading of the company show a profit of over £630,000.

A NEW COTTON RED.—It may be interesting to our readers to know that the Manchester Aniline Company are just introducing a new red for cotton, to compete against benzopurpurin and Congo red. It has the advantage of being about 30 per cent. stronger than either of these, and takes to the yarn much quicker, giving brighter shades, whilst the price comes in at least 20 per cent. cheaper. It is fast to hot soaping and light, and is dyed in a similar way to the benzopurpurin and Congo red methods, *i.e.*, in a soda bath, etc. Acids do not affect it nearly so much as they do these two colours.

AGRICULTURAL NOTES.—Manure for grain crops, per acre:—

Steamed bone flour	½	cwt.
Superphosphate	1	,,
Sulphate of ammonia	¾	,,
Nitrate of potash	¼	,,

For roots:—

Steamed bone flour	4	cwt.
Ground coprolites	2	,,
Sulphate of ammonia	½	,,
Nitrate of potash	¼	,,

The Sugar Market.—The refined sugar market has been very much demoralised during the past week, prices having rapidly declined owing to the partial break-up of the Magdeburg syndicate. The consequence of the downward movement is that buyers are more cautious than ever, and although quite without stocks, and with prices at a fairly safe level, will not purchase more than sufficient to cover regular supplies.

Electric Lighting.—The report of the Edison and Swan United Electric Light Company Limited states that the sale of lamps and the business of the company have progressed in a satisfactory manner during the year, and have resulted in a profit of £16,221. 17s. 8d., which sum the directors will propose to apply to the extinction of the amount standing to the debit of profit and loss. During the year the directors have paid off the mortgage of £3,000 on the Benwell and a like amount on the Green-street property. They are trying to find purchasers for these freeholds.

Margarine *versus* Butterine.—On Friday, the 5th instant, the Lords had under consideration the report of Amendments to the Margarine (Fraudulent Sale) Bill. The Earl of Wemyss has been specially active in this matter, and moved the first of seventeen amendments which stood in his name, namely, the alteration of the name "margarine" to "butterine." His Lordship said that if the arguments in favour of the name "margarine" as against "butterine" were sound they ought equally to prevail against the use of the names velveteen, coraline, ivorine, and gasoline. After an interesting debate in which Lord Thring, Lord Houghton, Lord Bramwell, the Duke of Argyll, Earl Granville, Lord Wantage, Lord Fitzgerald, and the Earl of Rosebery took part, and spoke in favour of the amendment, while Earl Fortescue, Lord Basing, the Earl of Suffolk, Lord Cranbrook, and Lord Truro spoke against it, and Lord Denman, who had previously suggested that butter substitute should be called by one of its old names "bosh" or "bogus," or that it should be described simply as "ine," expressed regret that he could not vote either for or against the amendment, their Lordships divided, 14 voting for the amendment and 52 against it.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday Morning.

Chief local feature is the labour struggle in the paraffin field, which is still undecided. There are signs that the American petroleum distillers now view more favourably some joint action with the paraffin refiners of Scotland towards a bettering of the market position of scale, so long depressed. Possibly a rise of 1d. per lb. may result from the negotiations pending, but at present paraffin products stand nominally unchanged, with very restricted movement of lots, the makers being unwilling to part with more than they can help at the low ebb values. In general chemicals Scotch makers have been rather more active in the despatch of orders. Soda ash, bleaching powder, and alum are slightly firmer. Caustic soda and sulphate of copper have given way a little, and soda crystals also, although production is still below the average.

Current quotations are:—Soda crystals, 46s., net Tyne; alum (lump), 97s. 6d., less 2½ °/₀ Liverpool; borax, English refined, £31, and boracic acid, £46, net Glasgow; soda ash, 48/52°, 1d., less 11 °/₀ Tyne; caustic soda, white, 76°, £9. 5s., 70/72°, £7. 10s., and cream, 60/62°, £6. 10s., less 2½ °/₀ Liverpool; bicarbonate of soda, 5 cwt. casks, £4. 15s., and 1 cwt. casks, £5, net Tyne; refined alkali, 48/52°, 1⅛d., less 5 °/₀ Tyne; salt-cake, 23s. 6d. to 24s., steady; bleaching powder, £7. 15s. to £7. 17s. 6d., less 5 °/₀; bichromate of potash, 4½d., and bichromate of soda, 3½d., less 5 °/₀ Glasgow, former weakened in demand, and latter also, but less so; nitrate of soda, 8s. 9d. to 9s. spot (slightly easier to arrive); chlorate of potash, 6d., less 5 °/₀ any port; sulphate of ammonia, £12. 7s. 6d. to £12. 10s., f.o.b. Leith; paraffin scale, 1½d. to 1⅞d., wax (good semi-refined), 2¼d. to 2½d.; spirit, 5¾d. to 6½d.; oil (good burning sorts, combination prices), 5d. to 5½d. per gallon at works, less 7½ °/₀ for large orders and decreasing rebate for smaller (these terms for Scotch consumed oil only, English and Irish at sellers' option); sulphate of copper, £13. 17s. 6d., less 2½ °/₀ Liverpool. Week's imports include (Glasgow)—3,165 bags nitrate of soda, 5,177 barrels rosin, 3,083 barrels and 4,553 bags sugar; also (Greenock landing) 24,923 bags sugar. Fire broke out in a Paisley chemical factory on Sunday, but got checked after about £1,000 loss.

THE TAR PRODUCTS MARKET.

There is but very little doing in benzols and in most other tar products, but prices are stationary and do not seem inclined to recede. The dark weather will now be coming on, and more gas made and consumed, so that we shall have more benzol upon the market soon. To-day's price is about 3s. 1d. for 90 °/₀ and 2s. 6d. for 50/90, while carbolic acid (60's) is firm at 3s. 3d. Anthracene is firm, at 11½d. for B and 1s. 3d. for A, notwithstanding the efforts which have been made to weaken it. Alizarine has been sold forward at 9d., and so the colour makers wish for cheap anthracene. Pitch remains unchanged, 13s. 6d. at port of shipment.

THE SULPHATE OF AMMONIA MARKET.

A great uncertainty is spreading, even as regards the near future. This feeling was of course inaugurated by the unwarranted reduction of the London quotations, and the producers in that market seem to take the nearest steps to reach a low level, which has started into life a strong "bear" movement, the consequences of which it is not easy to foresee if manufacturers themselves help in the movement. The country, meanwhile, has fairly maintained its position, as the small supplies do not necessitate any lowering of prices, there being always buyers ready to pick up prompt parcels at fair prices, while it is reported that sulphate on Beckton terms can now be bought below £12. 5s. in London. Values now stand at £12. 12s. 6d. Hull, £12. 10s. Leith, and £12. 7s. 6d. Liverpool.

THE PATENT LIST.

The following list has been compiled expressly for The Chemical Trade Journal *by* G. F. Redfern & Co., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

10585. S. Wolf. For improvements in or connected with the application or utilisation of acid sulphate of soda in the manufacture of cellulose, and for other purposes. July 30.

10588. F. Fenton. A communication from J. Woolford, of France, for improvements in extracting gold from simple, compound, and refractory ores, or slags, or wastes, or cinders of ores, or metals containing gold or gold blends. July 30.

10594. C. T. J. Vautin, of 23, Old Jewry, London. For an improved method of extracting gold from the various auriferous ores. July 30.

10610. T. O. Nesbit and T. Forster, of 46, Grainger Street West, Newcastle-on-Tyne. For an improved method of producing white lead and other compounds and combinations of lead. August 2.

10655. E. Turpin. For improvements in the production of explosives. August 2.

10667. E. Turpin. For improvements in explosives. August 2.

10684. E. Grahn. For an improved process for treating gas liquor and other ammoniacal liquors. August 3.

10723. R. Cuncliffe and J. Lund. For improvements in apparatus for calcining, drying, roasting, or carbonising substances or materials, and extracting gases, spirits, or acids therefrom. August 4.

OUR PRICE CURRENT.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
Acids:—			
„ Acetic, 25 °/₀ ... per cwt.	0	10	3
„ „ Glacial ... per lb.	0	0	6⅞
„ Arsenic ... per cwt.	0	13	6
„ Chromic ... per lb.	0	0	8
„ Fluoric ... „	0	0	5
„ Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
„ „ (cylinder) 30° Tw. ... „	0	2	6
„ Nitric, 80° Tw. ... per lb.	0	0	2¾
„ Nitrous ... „	0	0	2½
„ Oxalic ... „	0	0	4½
„ Sulphuric (fuming 40 °/₀) ... „	12	0	0
„ „ (Brimstone 168°) ... per ton	4	5	0
„ „ (Pyrites 168°) ... „	3	10	0
„ „ (spent oxide 168°) ... „	4	0	0
„ „ („ 150°) ... „	2	5	0
„ „ (Pyrites 150°) ... „	2	0	0
„ Tartaric ... per lb.	0	1	7
Arsenic, white powdered ... per ton	10	10	0
Alum ... „	4	15	0
Ammonia, ·880 = 28° ... per lb.	0	0	3½
„ = 24° ... „	0	0	1⅛
„ Carbonate ... „	0	0	3½
„ Muriate ... per cwt.	1	2	6
„ „ (sal-ammoniac) ... „	36/- & 34/-		
„ Sulphate (grey), London ... per ton	12	5	0
„ „ (grey), Hull ... „	12	12	6
Aniline Oil ... per lb.	0	0	10½
„ Salt ... „	0	0	9
Antimony ... per ton	38	0	0
„ (tartar emetic) ... per lb.	0	1	2
Barium Chloride ... per ton	7	10	0
„ Carbonate (native) ... „	3	10	0
„ Sulphate (native levigated) ... „	3	10	0
Bleaching Powder, 35 °/₀ ... „	7	15	0
„ Liquor, 7 °/₀ ... „	2	12	6
Bisulphide of Carbon ... „	13	0	0
Coal-tar Dyes:—			
Alizarine (artificial) 20% ... per lb.	0	0	9
Magenta ... „	0	3	9
Coal-tar Products:—			
Anthracene, 30 °/₀ f.o.b. Goole, per unit per cwt.	0	1	3
Benzol, 90 °/₀ „ ... per gallon	0	3	1
„ 50 °/₀ „ ... „	0	2	6
Carbolic Acid (crystallised 35°) ... per lb.	0	1	2
„ (crude 60°) ... per gallon	0	3	3
Creosote (ordinary) ... „	0	0	1½
„ (filtered for Lucigen light) „	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C. „	0	1	3
Grease Oils, 22° Tw. ... per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ... „	0	13	6
Coke-oven Oils (crude) ... per gallon	0	0	1½
„ (distilled) ... „	0	0	2
Copper (Chili bars) ... per ton	39	18	9
„ Sulphate ... „	13	17	6
„ Oxide (copper scales) ... „	36	10	0
Glue ... per cwt.	1	17	6
Glycerine (crude) ... per ton	33	0	0
„ (refined) ... „	53	0	0
Iron (turnings) ... „	1	13	0
„ Peroxide (blue billy) ... „	0	7	0
[illegible] (brown ochre) ... „	1	13	0
[illegible] [illegible]tated ... „	3	0	0
[illegible] ... „	1	2	6
[illegible] slag) ... „	1	0	0
[illegible] ... „	13	10	0
[illegible] ... „	26	5	0
[illegible] ... „	19	10	0
[illegible] ... „	22	10	0
Lime, Acetate (brown) ... per ton	9	17	6
„ „ (grey) ... „	13	15	0
Magnesium (ribbon and wire) ... per oz.	0	2	6
„ Chloride ... per ton	2	5	0
„ Carbonate ... per cwt.	1	17	6
„ Hydrate ... „	0	10	0
„ Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... „	19	10	0
„ Borate ... per cwt.	2	5	0
„ Ore, 70 °/₀ ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... per gallon	0	2	4
Naphtha (Wood), Solvent ... „	0	4	3
„ „ Miscible, 60° O.P. ... „	0	5	4½
Oils:— Castor ... per cwt.	1	4	6
Cotton-seed ... per ton	21	10	0
Linseed ... „	21	10	0
Lubricating, Scotch, 885°—890° ... „	5	17	6
Petroleum, Russian ... per gallon	0	0	5¼
„ American ... „	0	0	5⅝
Silver (metal) ... per oz.	0	3	8⅝
„ Nitrate ... „	0	2	8
Starches:—			
Sago ... per cwt.	0	8	9
Potato (farina) ... „	0	10	3
Sodium (metal) ... per lb.	0	6	0
„ Carb. (refined Soda-ash) 48 °/₀ per ton	5	7	6
„ „ (Caustic Soda-ash) 48 °/₀ „	4	0	0
„ „ (Carb. Soda-ash) 48 °/₀ „	4	5	0
„ „ (Soda Crystals) ... „	2	11	3
„ „ (Crystal Carbonate) ... „	5	6	3
„ Chlorate ... per lb.	0	0	7½
„ Borate (Borax) ... per cwt.	1	10	0
„ Bichromate ... per lb.	0	0	3½
„ Hydrate (74 °/₀ Caustic Soda) ... per ton	8	3	9
„ „ (70 °/₀ Caustic Soda) ... „	7	10	0
„ „ (60 °/₀ Caustic Soda, white) „	6	10	0
„ „ (60 °/₀ Caustic Soda, cream) „	6	6	3
„ Bicarbonate ... „	6	5	0
„ Hyposulphite ... „	5	5	0
„ Nitrate (95 °/₀) ex ship Liverpool per cwt.	0	9	0
„ Silicate (glass) ... per ton	5	10	0
„ „ (liquid, 100° Tw.) ... „	4	10	0
„ Sulphate (Salt-cake) ... „	1	4	0
„ „ (Glauber's Salts) ... „	2	2	6
„ Sulphite ... „	5	17	6
Potassium (metal) ... per oz.	0	3	10
„ Bichromate ... per lb.	0	0	4½
„ Carbonate, 90% ... per cwt.	0	19	0
„ Chlorate ... per lb.	0	0	6 1/16
„ Hydrate (Caustic Potash) ... per ton	23	5	0
„ Nitrate (refined) ... per cwt.	1	2	0
„ Prussiate Yellow ... per lb.	0	0	7½
„ Sulphate, 90 °/₀ ... per ton	11	0	0
„ Muriate, 80 °/₀ ... „	9	0	0
Strontium Hydrate, 98 °/₀ ... „	8	0	0
Sugar, Beet ... per cwt.	0	12	9
„ Cane ... „	0	14	6
Sulphocyanide of Barium ... per lb.	0	0	6
„ Ammonium ... „	0	0	9½
Sulphur (Flowers) ... per ton	9	5	0
„ (Roll Brimstone) ... „	5	10	0
Superphosphate of Lime (28 °/₀) ... „	2	0	0
Tallow ... „	29	0	0
Tin (metal) ... „	104	0	0
„ Crystals ... per lb.	0	0	7
Zinc (Spelter) ... per ton	14	12	6
„ Chloride (solution 96° Tw.) ... „	5	15	0

SATURDAY, AUGUST 20, 1887.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

X. THE ANILINE COLOUR INDUSTRY.

CONTINUING our remarks from page 87, whereon we called attention to the splendid series of colours exhibited by Messrs. Brooke, Simpson, and Spiller (Limited), and Messrs. Charles Truby and Co. (The Manchester Aniline Co.), we may now refer to what can be seen in their cases, Nos. 732 and 738 respectively. In the former exhibit some of the finest results of scientific research may be found. Starting with a sample of pure aniline, we find many products deserving careful attention which may truly be called the the intermediate products of the manufacture—binitrobenzol, binitrotoluol, diphenylamine—as well as the alpha and beta-naphthol, which strictly do not come under the definition of aniline colours proper.

The magnificent crystals of "chrysoidine" and "golden roseine" deserve notice from the dyers' point of view, showing as they do the perfection and purity of the product, a point too often neglected by the dyer in the race after cheapness. The fine series of soluble blues, ranging from the blue-black, passing through heavy red-shade blues to the exquisite pale shades, are well represented, and present to the dyer an unlimited number of tints for his use. Then, again, we have violets, greens, browns, scarlets, oranges, and yellows, all exceedingly pure and brilliant, the very perfection of what these dyes should be. Upwards of sixty representative colours of this firm are shown as specimens of the many which they make, and the exhibit taken as a whole, gives in a small compass some idea of the almost unlimited number of beautiful colouring matters produced by the labours of chemists from the once waste product coal-tar.

The exhibit of Messrs. Charles Truby and Co. is scarcely less interesting than the foregoing. Amongst the various articles to be found in Case 738 we may direct special attention to "Bismarck brown," "chrysoidine," and "saffranine," which from their great affinity for vegetable fibres, are of great importance to the cotton dyer. The brown and chrysoidine are probably two of the strongest colouring matters in the whole series of coal-tar colours. In the manufacture of Bismarck brown binitrobenzole is reduced by means of acid and iron filings into phenylenediamine, and by treatment with nitrate of soda the brown colouring matter is produced. It is made both in the form of crystal and powder. Chrysoidine is also produced from phenylenediamine by a modification of the process employed for the brown, and dyes a deep orange shade.

Saffranine is made by the reaction of nitrites on aniline oil, the resulting substance is then oxidised, by which process the colour is produced. By itself it dyes all shades of pink, and in combination with yellow or chrysoidine good shades of scarlet can be obtained. These colours are readily soluble in water, and in dyeing on cotton are usually fixed with sumach and tin.

Another colour recently exhibited is the new cotton scarlet, brought out to compete with benzopurpurin and Congo-red. It has the advantage of being brighter in shade, stronger in colouring material, and cheaper in price than the colours it is intended to replace, all decided advantages in these times of keen competition. It is employed in the same manner as the competing colours, that is dyed with soap and phosphate of soda or soda crystals.

Other colours are exhibited which are specialities of this firm, such as "malachite green" and "soluble blue;" these are largely used by calico-printers and dyers, and in the background of the case, we find most of the articles made by this firm used so extensively in dyeing and calico-printing for preparing, mordanting, or finishing their goods.

Messrs. Sadler and Co. Limited, of the Cleveland chemical works, Middlesbrough, have at Stand No. 744 a very good collection of coal-tar colours, but as the majority of them refer more to the anthracene colours than to those from aniline, we prefer to mention them in a future chapter.

In connection with this subject, Prof. Dr. Goppelsroeder, of Basel, has lent the committee an apparatus to show the production of aniline black on cotton and other effects upon dyestuffs by means of electricity, which may be found at Stand 779. Some years ago, we believe on the 30th of June, 1875, Dr. Goppelsroeder delivered to the Industrial Society of Mulhouse, a sealed paper, which was opened at his request on the 24th of November in the same year. In that paper he described the discovery he had made of the formation of colouring matters by the electrolysis of benzol derivatives. At the electrical exhibition of Paris in 1881, Dr. Goppelsroeder exhibited many specimens of colouring matters produced by the electrolysis of aniline and toluidine salts: violets of all shades, brown, blues, black, and reds were the principal colours obtained, and with them were shown thirty-six samples of silk dyed with these electrolytic colours.

Some of these effects are now exhibited at the Manchester exhibition, but the explanation is wanting to make the samples attractive. The formation and fixing of aniline black upon cloth is brought about in the following manner: The cloth or other material being saturated with a dilute solution of an aniline salt is then placed on an insulated metal plate, which must not be capable of being influenced by the reactions which take place. One pole of a battery or electric machine is connected with the metal stamp, which is placed upon the wet cloth, and having the pattern upon it, the bottom plate being connected with the other pole. When the current passes a black copy is produced on the cloth, the time required being dependent upon the strength of the current, temperature, etc.

Our next article will be devoted to the exhibits of anthracene colours at the exhibition, the description on page 92 serving as an introduction.

(To be continued.)

THE ECONOMICAL PRODUCTION OF OXYGEN.

WHETHER there would be a large market for oxygen for use in industrial operations could it be supplied at a reasonable rate, is a question upon which a long debate might be raised; still it cannot be open to doubt that for many small operations it would find extensive application. In a future article we shall endeavour to enumerate some of the uses to which a cheap supply of oxygen could be put, and from which it will be easy to see that the ordinary processes at present followed in laboratories are altogether out of the question.

The method usually followed for oxygen preparation in the laboratory, and even for oxyhydrogen work at theatres and the like, is to heat a mixture of chlorate of potash and peroxide of manganese, by which means oxygen is given off from the chlorate, the manganese remaining practically unchanged. The decomposition may be shown by the following formula:—

$$\begin{array}{ccccc} KClO_3 & = & KCl & + & O_3 \\ 245 & = & 209 & + & 96 \end{array}$$

One thousand cubic feet of pure oxygen weighs 89lb., so that allowing for manufacturing losses one thousand cubic feet of oxygen would be produced from 245lb. of chlorate of potash, which would not cost the user less than 7d. per lb. at his works, making the cost of one thousand cubic feet of oxygen about £7. 3s. Of course we should have the chloride of potassium remaining as a by-product, but this, even when refined to a white marketable salt, would not be worth more than 18s., the total amount of which would be swallowed up in the fuel, wages, and plant account. It will thus be seen that the industrial production of oxygen from chlorate of potash is, on account of its cost, practically impossible.

The next process by which oxygen has been prepared is by heating ordinary native peroxide of manganese, when the following decomposition takes place:—

$$\begin{array}{ccccc} 3\,MnO_2 & = & Mn_3O_4 & + & O_2 \\ 261 & = & 229 & + & 32 \end{array}$$

or, in other words, supposing the decomposition to be complete, which it never is, it would require half a ton of 70 manganese to produce one thousand cubic feet of oxygen

By reference to our prices current, this quantity of 70 % manganese would not cost less than 25s., so that it becomes necessary to recover the manganese if there is any life at all in the process.

In order to increase the yield of oxygen from peroxide of manganese, and to enable the decomposition to take place at a lower temperature, it has been proposed to mix silica with it, when the following reaction is stated to take place :—

$$Si\,O_2 + Mn\,O_2 = Mn\,Si\,O_3 + O$$
$$360 + 522 = 786 + 96$$

That is to say, it would take 7 cwt. of 70 % manganese to produce one thousand cubic feet of oxygen, costing for raw materials alone 17s. 6d. It is very probable, however, that this reaction would not take place so readily as the equation indicates, and the utilisation of the manganese silicate would perhaps not be so easy after all.

Another process has been much praised, but we believe it has never been put into general use, though patented by Kirkpatrick on May 6th, 1870, No. 1,300. By this method a strong solution of bleaching powder is treated with about three parts to the thousand of hydrated peroxide of cobalt, or of a cobalt solution; this determines the decomposition of the bleaching powder into oxygen and chloride of calcium, thus—

$$Ca\,O\,Cl_2 = Ca\,Cl_2 + O$$
$$Cl = 71 = 111 + 16$$

From this it will be seen that this process is more expensive than any, save that of the decomposition of chlorate of potash. It would require 1,200lb. of bleaching powder of 35 % to produce one thousand cubic feet of oxygen by this process, which would cost at the present price at least 80s., besides which the cost of manufacture would have to be reckoned in, as no by-product of sufficient importance is utilisable, and a certain working loss of cobalt preparations would inevitably occur.

Of the whole of the foregoing processes, that of simply heating peroxide of manganese seems the most hopeful, as if the same price could be realised for the manganeso-manganic oxide ($Mn_3\,O_4$) as is paid for the peroxide, the cost per 1,000 cubic feet of oxygen could be very materially reduced, and probably sold at a profit at four shillings per thousand cubic feet, or one halfpenny per pound.

Another process which has tempted many is the electrolysis of water. The cheapness of the raw material has been the attraction, but up to the present time no headway has been made with the process.

Such advances have now, however, been made in plating dynamos, and they have been sufficiently long introduced into practice, to enable us to form a very good estimate of what the cost of oxygen would be if manufactured by their aid.

A dynamo to deposit two tons of copper per 144 hours costs about £250. This requires a 30 H.P. engine to drive it, say with boiler, etc., another £400. This boiler would require at least two tons of good coal per day. One man by day and another by night might possibly do all the work required. This machinery then would produce not more than half a ton of oxygen weekly, or about twelve thousand cubic feet, so that the expenses would be :—

	s.	d.
Coal, 12 tons @ 8s.	96	0
Interest, etc., @ 10 % on £650 ...	25	0
Wages	60	0
	181	0

As only twelve thousand cubic feet of oxygen could be produced, the cost will not be less than 15s. 1d. per thousand cubic feet.

Recapitulating, we find that the various methods we have described may be compared as follows :—

	Per 1000 cubic feet.		
From chlorate of potash	£7	3	0
From bleaching powder	4	0	0
,, By electrolysis	0	15	1
,, By silica and manganese	0	5	0
,, From manganese alone	0	4	0

The last two instances are supposing that a sale is made of the residual oxide of manganese at a price equal to the peroxide purchased.

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

In our last article on this subject we had arrived at a period when Mr. Weldon had obtained protection "for the production of an artificial peroxide of manganese, meaning thereby an oxide containing more than 55 per cent. of peroxide, by injecting atmospheric air into a mixture of an inferior oxide of manganese with water or other *neutral* liquid." The italics are our own, and show clearly enough that at this time it was not then discovered by the patentee that an excess of lime was necessary for rapid oxidation. By an accident, too often happening in industrial research, it was found that an excess of lime was necessary, and this fact was patented by Mr. Weldon in 1868. Up to this time there is no doubt the patentee had only been following in the paths foreshadowed by others, and with the assistance of Mr. E. Bramwell, light was just beginning to dawn upon the process. At first, as we have already mentioned, the oxidation was performed in the stills themselves, then small square iron tanks were employed, after which there were employed larger tanks, still square, until finally these gave way to the circular boiler-shaped oxidiser as exists amongst us to-day. Up to this time the energy expended on this process had been enormous. Mr. Gamble had given without stint his money and time, while Mr. Bramwell, his manager, the only man at that time about the undertaking save Mr. Gamble himself, who understood the principles of the processes they were operating, spent most of his nights and days in aiding Mr. Weldon to overcome the many difficulties which were continually cropping up. The magnesia reaction was finally given up as unworkable, and when all the energy was concentrated on the lime process progress continued to be made.

It was in 1868 that the necessity of the use of an excess of lime was accidentally discovered, and the patent specification, the outcome of this discovery, is such a curious specimen of patent literature that it deserves the attention of all manufacturing chemists.

When the importance of the excess of lime was recognised, it became an easy task to arrive at least at 75 per cent. of the theoretical oxidation, but the net result, so far as the consumption of hydrochloric acid was concerned remained the same, and even practically receded from a better position, inasmuch as the acid which was consumed by one equivalent of a mixture of lime and manganese protoxide had now risen to that quantity which one and a quarter equivalents would consume. Moreover, it was also found that the settling would not take place so readily in an alkaline solution as in a neutral liquid, and this was a serious difficulty to get over. Indeed, even at a much later date it had not been ascertained what was the least proportion of lime absolutely necessary as "excess lime," and in the early days of this excess one equivalent was added as precipitating lime, and three-quarters of an equivalent excess. An amusing incident occurred at this time. A workman named George Grayson was at that time in charge of the oxidiser, and the excess lime having been put in too quickly on strong manganese liquor, the batch went thick, the oxychloride of calcium having been formed. This was a new experience, and as the contents of the oxidiser could not flow out by the usual channel, the manager peremptorily ordered the man to get inside and "spade it out." This was attempted, but poor Grayson sank in the semi-solid mass, and had it not been for the crossbars in the oxidiser, life would have been sacrificed in the attempt to make science subservient to practice.

After many attempts to induce good settling, it was even- by the addition of "final liquor" to the To this end, after an oxidisation of 75 per attained with a proportion of one-half an ess lime, neutralised still liquor was added the blowing being continued until oxidation

proceeded no farther. It was thus found possible to produce not only good settling mud, but mud with a much reduced base.

In his specification of July 26th, 1866, Mr. Weldon did not bind himself to accept any theoretical constitution of the mud, but said "it liberated exactly the same amount of chlorine which according to theory a pure sesquioxide would," or was $Mn\,O + Mn\,O_2 = Mn_2\,O_3$. By the new method of working with excess of lime the proportion of bases was actually increased above the one equivalent; and by the use of "final liquor" the bases, that is the lime and manganese protoxide, were always below the proportion of one equivalent to one of peroxide.

The working out of all these details were not completed in a moment, and it can be confidently asserted that the process as we now know it was not actually complete before 1871, six years after the first patent was taken out by Mr. Weldon.

We may now ask the question, in what respects the 1871 mud differed from the 1866 production? We have it on Mr. Weldon's own statement that that mud, a substantially pure protoxide of manganese, by the injection of air was transformed into sesquioxide, or one equivalent of base to one equivalent of peroxide; why should not this compound have been good enough for the manufacture of chlorine?

(To be continued.)

THE TWENTY-THIRD ALKALI ACT REPORT.

V. CEMENT WORKS.

Why cement works were ever put under the supervision of the inspectors of the Alkali, etc., Works Act is a mystery to many, and certainly nothing has appeared in the reports of the chief inspector to justify any interference on the part of the legislature.

There is certainly a white cloud emanating from the chimneys of many cement works and from the open kilns now in use in some districts, but no one has ever suggested that this white cloud has ever done a particle of damage, so far as health or vegetation is concerned. We have made many experiments with regard to cement works chimneys when this white cloud was being emitted, and on some occasions found the escaping gases to be alkaline to test papers, and never have we found in a cement works chimney the same amount of acidity as is nearly always present in a factory chimney, where steam only is generated. The fact is that the white cloud, supposed by the unitiated to be sulphuric acid is little less than lime dust, mixed with more or less *sulphate of potash*. The potash is volatilised from the aluminous material during the high firing of the kiln and unites with the sulphurous acid of the fuel smoke, producing, finally, by oxidation, an impalpable powder of sulphate of potash, which is wafted up the chimney by the draught.

Roughly, Portland cement may be stated to be manufactured in two ways—first, by burning a mixture of clay and ground limestone or chalk; and, second, by treating a mixture of chalk and river detritus in a similar manner. In the former case there is no appreciable odour arising from the kilns, whilst in the latter instance the organic matter present in the detritus, does in some form of kilns give rise to empyreumatic gases, which are, to say the least, not always pleasant. But the question arises, were the Alkali Acts instituted for the suppression of such odours as these? If so, there are very many trades indeed which should be brought under inspection, and we know nothing worse in a crowded thoroughfare than the acrylic odours pouring out of the fried-fish shops, where cotton-seed oil is used in the cooking operation.

In the manufacture of Portland cement the aluminous materials are ground up with the calcareous substance, until a perfect mixture is made, the magma, called "slurry," is by one method run out into backs to settle, and as much water drained away as possible; the mud being placed on hot floors to dry preparatory to being burned in the kiln. By another method, called the Gorham process, the slurry is pumped into large chambers, where it is dried by the waste heat of the kilns passing over it on its way to the tall chimney. By the first process, the gases are evolved from the kiln at a comparatively low level, and when the dried slurry is getting warm, a kind of dry distillation is being effected, frequently giving off an objectionable odour. In the Gorham process no doubt the same odour escapes, but being connected with a tall chimney the gases do not reach the ground before dilution.

We find on reference to the report that 93 cement works are under inspection, and seeing that they produce a yearly revenue of £279 to the State, it is hardly likely they will cease to be inspected, though we are very strongly of opinion that the time of the inspectors would be better employed in looking after some of the other works which *are* injurious. Our remarks seem to be confirmed by the absence of any notice of cement works in the Chief Inspector's report. Again, taking the supplementary reports of the district inspectors, the information they give is exceedingly meagre. Two cement works exist in district No. 1, but no mention of them is made in Mr. Curphey's report. In district No. 2 Mr. Bernard E. Smith, assisted by Mr. Frank Fletcher, has examined the gases from some of the 189 kilns existing in his district. As might have been expected a considerable amount of carbonic oxide is evolved, until the contents of the kilns get fairly hot, then no trace of this gas can be found; the amount of sulphurous acid varied between 0·50 and 0·75 grain per cubic foot, a quantity much greater than we have ever found in any kind of kiln, while the solid matter carried away in suspension varied between 0·3 and 0·5 grain per cubic foot.

In district No. 3 Mr. Ballard testifies to the truth of our remarks:—Works No. 789.—"A laboratory has been built, and the manufacture is now carried on in a more scientific manner than heretofore. There are no signs of destruction to neighbouring vegetation, neither have there been any complaints."

Mr. Carpenter gives a very terse report upon the six cement works in his district. "The only change this year is the addition of a closed kiln at works 1,142; the three open ones are to be altered to this type in 1887." Mr. Jackson, in district No. 5, is almost equally as terse, and his report would be more suited for the pages of a manufacturers' trade journal than for a report on noxious vapours. Why should the public be only told that the kilns produce 23 tons of finished cement per charge? What the public requires to know is, how much noxious vapour does this or that works send out. Dr. Fryer's report is the only one which has any real scientific interest from the public standpoint. He gives the average acidity in each of the four works in his district, which varies from 0·022 to 0·092 grain per cubic foot, numbers which agree very well with our own. He also gives the amounts of chlorine, total solids, and volatile matter, all of which go to prove the position we have taken up,—that cement works are innocuous, and never should have been included in the schedule.

(To be continued.)

BLEACHING BY ELECTRICITY.

THE PROCESSES OF WATT, LIDOFF, NAUDIN, AND HERMITE.

Ever since the discovery of the subtle force now known as electricity, inventors have turned their attention to processes for splitting up chemical compounds by its aid. Pats van Trostwyk, in 1789, pointed out how water was decomposed by a current of static electricity, and so early as 1805 Brugnatelli exhibited silver coins plated with gold; but it was not before 1838 that there was any practical outcome from these observations. In that year Jacobi laid before the academy of St. Petersburg some copper-plate reproductions, and two years later Elkington began the electro-plating industry in England; but it was not until 1851 that any serious proposal was made to produce chemical compounds by electrolysis.

On the 25th of September, 1851, Charles Watt obtained a patent for methods of decomposition of saline and other

substances by the agency of electricity, using as his source "a Daniell's constant battery of six cells." The electrolysis of chlorides, nitrates, and sulphates were all recommended and described, and the wording of the specification is such as to show that the patentee must have worked very assiduously at the subject. The second portion of the specification sets forth very clearly the changes which take place on submitting solutions of chlorides of the alkalies and the alkaline earths to electrolysis. Watt claimed the use of the process for converting these chlorides into hypochlorites and chlorates, and very minutely described the details he proposed to follow. Two electrodes were placed in a vessel, provided with a steam jacket, and filled with a warm solution of the chloride, to which was added a portion of free alkali or alkaline earth. On connecting with the battery, the decomposing vessel being kept warm, say from 100° to 120° F., hypochlorite was produced; whilst if a chlorate was required, the temperature was raised and continued. The patentee winds up his specification with the statement that "this mode of forming hypochlorites may be used for preparing a bath for bleaching purposes."

So long as primary batteries were the main source of supply of electrical currents, it is not surprising that the operation of electrolysis remained under a cloud; but when dynamos began to be constructed from formulæ carefully worked out with the aid of well-ascertained laws, so that electrical currents became available from their cheapness, a fresh impetus was given to these ideas. Thirty years after Watt had cleared the ground, Lidoff and Tichomiroff essayed to do exactly the same thing, and to produce hypochlorite of soda direct from common salt for use in bleaching. From the investigations of these two engineers it became evident that the whole of the electric energy expended could not be reckoned upon as efficient in bleaching, still it was left open to doubt whether electric bleaching could in point of cost be ever capable of competing with what might be strictly called chemical bleaching, viz., by the use of bleaching powder.

Again, what has become of Naudin and Bidet's process of electrical bleaching in which the current from a dynamo was also made to electrolyse a solution of common salt, the hypochlorite solution thus formed being continually circulated through the kier containing the goods to be bleached, and back again into the tank containing the electrodes between which the decomposition takes place?

In 1886 we are treated to the Hermite process, though we fail to see in what respect this differs from the proposals of Watt in 1851. It is true we have the precedent of the manganese recovery process before us, in which for over thirty years the same operations were patented over and over again before any one made the recovery a perfect commercial success. But, do we find an analogous instance in the Hermite process? Watt, in 1851, tells us that besides hypochlorite, chlorate of the base is also formed, and this product is well known to possess no bleaching action when used in the ordinary way.

At first sight it would appear that these difficulties had been overcome, and that the electric current had been made to do only the work required without wandering around in the formation of secondary products; but, unfortunately, the only experiments published have furnished the idea that some inaccuracy has crept in, and that the electrical measurements were not so carefully made as they ought to have been. Messrs. Cross and Bevan, who have examined this process, have given their results as yielding about 10 per cent. more chlorine than theory indicates possible, allowing nothing for the secondary decompositions which Watt tells us so clearly are sure to take place. Supposing even that M. Hermite is able to utilise all the electrical energy which theory places at his disposal, he does not indicate in any way by what means these secondary decompositions have been suppressed, so that the statements of Messrs. Cross and Bevan that a bleaching solution equivalent to one ton of bleaching powder can be produced at a cost of £2 10s. must, until some further explanations are forthcoming, be received with very great caution.

Dr. F. Hurter has, however, thrown some new light upon the electrolytic decomposition of chlorides. He has shown that with an ordinary apparatus not more than 20 per cent. of the electrical energy is utilised in the production of available chlorine, that is, chlorine and its compounds of use to the bleacher or paper maker, and therefore at the very least, supposing no better results to be obtainable, the cost of chlorine and its oxidised bleaching compounds reckoned as bleaching powder cannot be less than £12 10s. per ton, and in practice would probably be very much more.

Messrs. Cross and Bevan have stated that the bleaching efficiency of the electrolysed solution, measured by means of the ordinary chemical tests, is stronger than that furnished by a solution of bleaching powder tested by the same method and found equal in the proportion of 5 to 3. We are willing to admit the possibility of this, though by Dr. Hurter it is held improbable, as it is quite possible that the electrolysed solution may contain some compound of chlorine capable of uniting with the colouring matter in the goods or pulp undergoing the operation of bleaching, thereby rendering it soluble and thus eliminating it without oxidation, as it is well known that a considerable quantity of colouring matter is extracted from grey cotton goods during the process of "boucking" before it comes in contact with a particle of bleach.

We await with interest M. Hermite's reply to Dr. Hurter's criticism, and hope that at no distant period he will tabulate actual measurements, and show how he has been able to overcome the secondary decompositions first mentioned by Watt and corroborated by Lidoff, Tichomiroff, and Hurter.

THE LIVERPOOL MINERAL MARKET.

There is no material alteration to report in prices this week. Manganese: Prices are easier, arrivals having very much increased. Magnesite (containing 98 per cent. carbonate of magnesia): Stocks remain large, and prices are easy at 30s. for raw lump; raw, £6. 10s.; and calcined ground, £12. Bauxite: Ground (Irish Hill quality) is in increasing demand, lump, 20s.; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: More doing, but prices remain without alteration at 85s. to 90s. for medium, and 95s. to £5 for the best G G B. Barytes continue scarce, especially for best qualities. Carbonate: Finest selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone continues in demand, ground, £6. 10s. to £7, specially selected lump, finest quality, £9 to £10. 10s. Iron ore quiet. Purple ore, 7s. Emery-stone: There is more change, but prices are steady at £5. 5s. to £5. 15s. for lump; small £5. Fluor and felspar unchanged. Fullers' earth quiet; (Emerald brand)—best lump, 50s.; fine impalpable ground, £7. Wolfram and tungstate of soda as last reported. Tungsten metal unaltered at 2s. 6d. per lb. Tungsten alloy 2s. per lb. Chrome ore as last quoted—that is, 80s. to 85s. for 50 per cent., and 60s. for 40 per cent. Antimony ore, £8 to £10 for fair quality; best, £18. 10s. Antimony metal, £31 to £32. 10s. Uranium, 20s. to 32s. 6d. Asbestos: Best rock, £18; brown grades, £14 to £15. Potter's lead, £11 to £12. Calamine quiet, 60s. to 80s. Strontia: More doing; sulphate (celestine), 19s. to 20s. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Plumbago: Best Ceylon lump, £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £5 to £15 per ton. French sand, 19s. Ferro-manganese firmer, 80 per cent. packed, £11. 2s. 6d.; 70 per cent. packed, £10.; 60 per cent. packed, £8. 16s.; 50 per cent. unpacked, £7. 15s.; 40 per cent. unpacked, £7. 5s. Spiegel, 20 per cent. £4 12s. 6d. Silicon spiegel, 9 per cent., £8. Chrome pig, 9 to 10 per cent., £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8.

TERMS OF SUBSCRIPTION.

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GERMAN CHEMISTS.

o the Editor of the Chemical Trade Journal.

have read the letters of "Menenius" on pages 69
your valuable journal, and I cannot comprehend
ould have "run amuck" with the German chemists,
enture to say offhand that not one single one of my
untrymen has ever done him even a little bit of
Menenius" writes of the German chemist as if he
ncompetent and underpaid individual, whose sole
in life was for the purpose of pushing out the
hemist from his employment. Now, Mr. Editor, I
sh to fall out with any English chemist, as I have
friends amongst them, acquired during my sojourn
untry; but I will venture to tell "Menenius" that
possible to procure the average salaries of both
nd German chemists who are at present working in
ry, he would find that the German was drawing the
ary.
h for the "cheap and nasty" theory of "Menenius,"
my humble opinion, would have been better
It is an undisputed fact, however, that some
rers do prefer German chemists, owing chiefly, I
their systematic method of working, and to their
nature, as every German chemist has been trained
ist, which is more than *most* English chemists can
ery many indeed have gained the whole of their
e at some evening instruction of a year's duration.
own part I believe that our systematic methods are
r system of military training, as also to the very
professors we have in Germany. The old style of
essor has died out in England, and the shades of
Graham, and Miller must look very mournfully
English chemistry of to-day.
ore point and I have finished. You never find
hemists in England doing the same routine work,
day, as English chemists of good education may be
. They value their talents too highly for that class
and it may be taken for granted that if the manufac-
not employ their knowledge to better advantage, the
hemist generally looks out for some one who can.
trespass any longer upon your valuable space, and
scribe myself, A GERMAN CHEMIST.

RESPONDENTS.—We have received several other
from correspondents with requests for publication,
n want of space we are compelled to let them stand
ll next week.—ED.]

Our Book Shelf.

PRACTICAL ORGANIC CHEMISTRY. By J. B. Cohen, Ph.D., F.C.S., Assistant Lecturer on Chemistry, Owens College, Manchester. London: Macmillan and Co.

Text books treating of the practical side of inorganic chemistry are rare, while those of any help to the student of organic chemistry are rarer still. It is with great pleasure we announce the appearance of this useful little work, in which the author has cut out a new path of his own, by the exclusively practical character of the lessons and by the style he has adopted. The study of practical organic chemistry has been much neglected in this country, and no doubt this has been partly for the reason that no text-book of the kind before us existed in the English language, and we do not know of any English text-book whatever giving such full and complete details of necessary operations as the one before us.

In a very modest preface, the author states that its primary purpose is that of a laboratory guide, and that its use should be supplemented by reference to some of the large text-books, as well as to the original sources of chemical literature mentioned at the head of each preparation. Briefly, it may be stated, that this treatise accurately describes the preparation of nearly ninety organic substances, which many students of organic chemistry have only been familiar with in books, and never have had the opportunity of practically preparing them, owing perhaps to the idea that such processes were too difficult.

The first part is mainly devoted to the preparation of various members of the aromatic series, such as nitrobenzene, aniline, phenol, picric acid, cinnamic acid, and a host of others, and on this account we recommend the work to the notice of all chemists engaged in tar-works. Part II. relates to the preparation of fatty derivatives, such as succinic acid, glycocoll, formic acid, acetaldehyde, and the more common products, as ether, chloroform, ethyl, acetate, etc.

As an instance of the interesting experiments which may be performed by the aid of this work we will mention that described in chapters xx. to xxii., whereby benzoic acid may be made from pure toluene. The toluene is first chlorinated by means of a rapid current of chlorine and the benzylchloride separated by distillation. In the next chapter the preparation of benzaldehyde, or bitter almond oil, from benzylchloride and copper nitrate is accurately described; while in chapter xxii. the formation of benzylalcohol and potassium benzoate from benzaldehyde and caustic potash is minutely set forth, so that the student is able to start with the products of coal-tar and toluene, and end with the substance which only a few years ago was solely obtained from gum benzoin, a purely vegetable product. Pages 7 to 12 will be found devoted to the subject of fractional distillation, and we think such an important operation should have been treated of more fully; no doubt if the work runs to another edition, which we feel confident it will, the author will describe the details more fully, as with the aid of fractionating columns illustrated on page 10, it is possible when they are properly used, to get very good separations of the various benzene hydrocarbons with less application than the author indicates.

Such a work as the one before us has been much wanted, and we hope a favourable reception to this will induce others to issue similar hand-books upon the various departments of practical organic chemistry, so that the rising generation of chemists may not be left behind in that race, which though commenced in England, has so far only been running in Germany.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FIFTY-SEVENTH MEETING, TO BE HELD IN MANCHESTER, 31ST AUGUST.

THE Executive committee report: That the Right Worshipful the Mayor of Manchester, Alderman J. J. Harwood, has accepted office as a vice-president of the Association, and

has consented to act as a member of the Executive committee and sub-committees in the place of the late Alderman Curtis.

To secure the efficient arrangement of the Reception and Section rooms, the committee have engaged the services of Mr. Alfred Darbyshire, F.R.I.B.A. Plans have been prepared for a large luncheon room, with the necessary kitchen accommodation, and for lavatories and retiring rooms, and these buildings are now in course of erection in the quadrangle of the Owens College. The ground floor of the new Natural History Museum will be used for the Association and local offices, and for the post-office; the first floor will be fitted up as reading and writing rooms, a ladies' room, and a smoking room; and in the galleries of the museum space will be provided for the exhibition of any specimens or apparatus shown in illustration of the papers read in the several sections. The necessary fittings for these rooms have been designed, and are in process of construction.

The Postmaster of Manchester has kindly undertaken all arrangements for the branch post and telegraph office in the Reception room; the Council of the Owens College have lighted the room expressly for the meeting; and telephonic communication has been established between the Reception room and the several Section rooms.

The Mayor of Manchester has invited the members and associates to a conversazione in the Town Hall, on Tuesday evening, September 6th.

The Executive committee of the Royal Jubilee Exhibition, who had previously offered to reserve an evening for the Association, have since invited the members and associates to the exhibition as their guests, on the evening of Tuesday, the 1st of September.

The evening lecturers have been communicated with, and the necessary appliances to illustrate their lectures at the Free Trade Hall are being prepared in accordance with their wishes.

A large number of excursions have been arranged for Saturday, September 3rd, and Thursday, September 8th; and offers of hospitable entertainment have been received and accepted in connection with several of these. His Grace the Duke of Devonshire has invited a party to Bolton Abbey; and invitations have been received from his Grace the Duke of Westminster to visit Eaton Hall; from W. H. Forster, Esq., and Sir Thomas Storey to visit Hornby Castle and Lancaster; from W. Morrison, Esq., M.P., to visit Malham and Gordale; from the Rev. M. Farrer to visit Ingleborough; and from the Directors of the London and North-Western and Lancashire and Yorkshire Railway Companies to visit their locomotive works at Crewe and Horwich. Hospitable offers have also been received in connection with excursions to Northwich, Buxton, Stonyhurst, Tatton, Macclesfield, Gawsworth, Clitheroe, the Liverpool Docks, the Longdendale reservoirs, and Worsley. The Liverpool Marine Biological committee have arranged for a day's dredging expedition: an invitation has been received for a visit to the Isle of Man at the close of the meeting; and several other excursions have been organised. Many of the principal works and mills will be open for inspection during the meeting.

Invitations to Garden Parties have been received from several gentlemen; and the Feoffees of Chetham's Hospital have asked a party to visit the hospital and Cathedral.

The committees of the leading clubs have consented to grant the privilege of honorary membership to members during the time of the meeting; and the rooms of the Literary and Philosophical Society, the Portico, and the Athenæum, will also be open to them.

Descriptive accounts of the excursions are being prepared; and arrangements have been made for issuing these in a convenient form for reference, accompanied by an outline map showing the railway routes.

A short description of the natural history, antiquities, and industries of the district has been written by gentlemen specially conversant with the several subjects dealt with. This will be issued as a separate book, and the greater part of it is already in type.

A plan of the central portion of the city, showing the position of the Reception and Section rooms, and th stations, hotels, etc., has been prepared for the tick request of the officers of the Association. A maj chester and Salford, including a wider area than has been drawn for the local programme, and engraved. An outline plan of the Reception, Lunch rooms will also be included in the programme.

The efforts of the committee to secure the presen meeting of distinguished foreign men of science with very great success. The number, already co over a hundred, and still more the eminence of our almost every branch of science, have attracted mu tion, and would alone suffice to render the m exceptionally interesting one.

Of the members of the Association more than a have already announced their intention of atte meeting, and a large number of ladies and gentle sent in their names as new members or associates.

Notes and Queries.

Kleptomania of Course.—At the Manches Jubilee Exhibition may be found a series of laborato manufactured by Mr. John Heywood, and fitted wi and solutions by Messrs. James Woolley, Sons, Among these solutions are certain rare names, bic platinum, etc., etc., and we have been requested t order that no inconvenience may happen to the pil the orange-coloured fluid in the chloride of platinun only coloured water, and therefore will not give the reactions in the laboratory. It appears that som been gradually and systematically abstracting this not having yet found out its bogus character.

The London Nitrate Company.—This com been formed for the purpose of acquiring and wo rich and valuable nitrate grounds and works of Pu and San Antonio, situated in the Province of Ta the Republic of Chili, fifty-two miles by rail from t shipping port of Pisagua, and twenty-two miles by the port of Caleta Buena, and are immediately a the celebrated "Oficina," or works of "Agua Sa railway has been projected to connect these prope Caleta Buena, which, if constructed, would increase their value. The properties together co area of about 209 Peruvian Estacas, which are equa 1,400 English acres. During 1886 the business ne £25,000 on a production of approximately 13,00 nitrate, equal to about one-third of the then product of the works, the production having been thus limit to the existence of a general combination of the in reducing the output during that year; this co terminated on 31st March last. The actual price fo sailing being from £8. 10s. to £9 per ton leaves a v some margin for profit, or for a fall in the price of t For practical and commercial purposes it may be nitrate of soda is only found on the West Coast America and in Chilian territory. It is principally agricultural purposes, either as pure nitrate of soda important ingredient in the manufacture of artificial The consumption has increased from about 100,0 1865 to between 400,000 tons and 500,000 tons p in later years. At the present price the consumpt to increase considerably.

The Shares of the Badische Anilin an Fabrik rose 14 per cent. at a bound when it becar on the Frankfort Bourse that the House of Lords ha in favour of the German firm in their suit agains Levinstein and Co.

Wines and Beer.—The important decision has given that while it is permissible to blend wines a no vendor of beer who is not a brewer may strength by admixture. A London publican has b by a magistrate for adding small beer to a stronger on appeal, the infliction of the penalty was upheld.

THE ECLIPSE ELECTRIC BATTERY COMPANY (LIMITED). The prospectus is issued of the above company, which has been registered with a capital of £100,000, with the object of purchasing the patents of Messrs. H. J. Harris and J. J. Walsh in certain voltaic batteries which, it is said, can be supplied at a good profit, with lamp and all necessary appliances, for £2. 10s., and at a cost of 2s. per charge will supply a good light for twenty-four hours. The office of the company is at The White House, Telegraph-street, E.C.

CANADIAN PRODUCE.—Manitoba butter is beginning to find its way in large quantities to the Pacific coast. The quality is good, and there is no reason why it should not supplant the California butter in the Vancouver market. Nearly fifty packages arrived on one day, and several dealers are making arrangements to receive supplies at regular intervals.

SCOTCH AND IRISH OXYGEN COMPANY (LIMITED).—Registered capital, £200,000, in shares of £5 each. Object, to enter into and carry into effect an agreement (not filed at Somerset House) made between Robert Raynsford Jackson of the one part, and the company of the other part, for the grant of licences to use the patent rights and inventions therein mentioned.

SCIENCE AND PRACTICE.—It is reported that Professor Bernhusen, the well-known German chemist, will resign his professorship at the University of Heidelberg, and accept the post of director of the scientific chemical department of the chief laboratory of the Badische Anilin and Soda Fabrik.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

THE lockout in the paraffin products manufacture continues, and one or two of the stocks are beginning to show signs of approaching exhaustion. There has been a further rise in paraffin spirit; wax and sulphate of ammonia also are if anything firmer. An agent has been appointed for Glasgow and district to push the Baku (Caspian) mineral oil in opposition to the Scotch article, but the thing is as yet but in the stage of experiment. What progress there may be to make will be watched keenly by the trade. Dulness still pervades chemicals generally, and several articles have slightly receded in price. Bichromates have been at quite a low ebb of despatch, particularly as affecting the English market, to which for a week almost nothing has gone, the Midland strike no doubt partly the cause. Caustic soda, bleach, soda crystals (not so scarce now), and salt-cake are all easier; but despite the protracted feebleness which has ruled so long, there has arisen just now some talk in this quarter of a new start in the manufacture. Current prices are:—Soda crystals, £2. 6s., net Tyne; alum (lump), £4. 17s. 6d, less 2½ °/₀ Glasgow; borax, English refined £31, and boracic acid, £46, net Glasgow; Soda-ash, 48/52° ⅞d., net Tyne; Caustic soda, white, 76° £9. 5s., 70/72° £7. 10s., and cream 60/62° £6. 5s., less 2½ Liverpool; bicarbonate of soda, 5 cwt. casks, £6, and 1 cwt. casks, £6. 5s. net Tyne; refined alkali, 48/52°, 1¼d., less 5 °/₀ Tyne; salt-cake, 23s. to 23s. 6d; bleaching powder, £7. 10s. to £7. 12s. 6d., less 5 °/₀ on rail Glasgow; bichromate of potash, 4½d., and bichromate of soda, 3½d., less 5 °/₀ f.o.b. Glasgow; nitrate of soda, 8s. 9d.; chlorate of potash, 6d., less 5 °/₀; sulphate of ammonia, £12. 7s. 6d. to £12. 10s., f.o.b. Leith; paraffin scale, 1½d. to 1⅞d., wax (120°) good semi-refined, 2½d. to 2⅝d., spirit, 6¾d. to 7d., and burning oil, 5d., to 5½d., Scotch consumption only. Week's imports include 1,691 tons pyrites, and of sugar 400 boxes and 900 barrels.

THE TAR PRODUCTS MARKET.

BENZOLS have but a nominal value, and the present prices for spot delivery remain unaltered. The outlook for the future is very grave, and tar distillers who have been bidding even moderate prices for tar will find ere long that they are paying t[illegible] opinion t[illegible] values, th[illegible] proportion[illegible] generally [illegible] tainly not [illegible] tar consume[illegible] this year, w[illegible] price of benzo[illegible]

To be forewa[illegible] tar does again[illegible] lower, gas-ma[illegible] blame. There [illegible] ready, but delays[illegible]

To-day's benzo[illegible] 2s. 5d. for 50/90, [illegible] fairly be said to have [illegible] firm, but buyers will not pa[illegible] of the pitch market is uncertain[illegible] that the supply will exceed the dem[illegible]

AGAINST THE ST. HELENS COPPER WORKS COMPANY.

[illegible]rius Court, at Liverpool, on the 6th instant, [illegible]ith had before him the case of Whitfield *v.* [illegible]per Company Limited. In this action the [illegible] farmer residing near St. Helens, sought to [illegible]ges for injuries to his crops by the smoke [illegible]he defendants' copper-smelting works.

[illegible]ared for the plaintiff, and Mr. Kennedy, [illegible]ift appeared for the defendant company. [illegible] that he had occupied his farm, situated [illegible] fifteen years, and paid £40 a year rent. [illegible] his crops were damaged by the smoke [illegible]ks, which lay about half a mile away [illegible]e was a north-west wind the smoke [illegible]ft a blueish scum on the crops. [illegible]s in the vicinity. When he [illegible]nt in a claim for £10 to [illegible] that year. He saw [illegible] promised to pay [illegible]s in the neigh- [illegible] was not [illegible] County [illegible] to

THE SULPHATE OF AMMONIA M[illegible]

SULPHATE has experienced a sudden drop in the L[illegible] market, and Beckton make can now be bought for £12 [illegible] ton. The market is still reported as being very dull, and even outside London makes have been offered at £12. 7s. 6d. It is the opinion of many makers of this article that £12 is a very fair price for sulphate of ammonia, as other things go, but they do not consider it should fall below this price. Leith price is quoted at £12. 7s. 6d., and Hull £12. 10s. to £12. 11s. 3d., but we have heard of sales at this port below these figures, and should not be surprised to hear of a fall in value of considerable moment.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

10818. J. HANSON. For the utilisation of alkali waste for the manufacture of sulphuric acid. August 6.

10892. T. C. LOVEWELL and J. YONGE. For an anti-poison stopper which will prevent accidental poisoning. August 9.

10900. J. B. THOMPSON. For improvements in the manufacture of soda, and in apparatus for the purpose. August 9.

10904. A. H. CURLING and J. DUNBAR. For improvements in the deodorisation and disposal of sewage, and in apparatus therefor. August 9.

10918. F. W. DÄHNE. For improvements in refining copper, copper regulus, and copper precipitate, and more especially such copper products as contain arsenic and other volatile impurities. August 9.

10942. H. C. BULL AND CO. LIMITED and H. C. BULL. For improvements in and connected with the treatment of sewage. August 10.

10955. L. MOND. For improvements in obtaining ammonia, chlorine, and hydrochloric acid from ammonium chloride, and in apparatus therefor. August 10.

10966. T. SCHLOESING. For improvements in the treatment of hydrochlorate of ammonia, resulting from the manufacture of carbonate of soda with a view to the extraction of chlorine. August 10.

10992. W. H. STEAD. For improvements in the treatm[illegible] of cotton seed, for the removal of fibrous mat[illegible] therefrom, and in apparatus therefor. August 1[illegible]

has consented to act as a member of the Execut
and sub-committees in the place of the late Al

To secure the efficient arrangement of the
Section rooms, the committee have engaged
Mr. Alfred Darbyshire, F.R.I.B.A. Plans
pared for a large luncheon room, with the n
accommodation, and for lavatories and ret
these buildings are now in course of erection
of the Owens College. The ground floor
History Museum will be used for the A
offices, and for the post-office; the first fl
as reading and writing rooms, a ladies' ro
room; and in the galleries of the museum
vided for the exhibition of any specimen
in illustration of the papers read in th
necessary fittings for these rooms hav
in process of construction.

The Postmaster of Manche
arrangements for the bra
Reception room; the
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PRICE CURRENT.

AND CO., 116, PORTLAND STREET, MANCHES

rks, or at usual ports of shipment in U.K.

localities may vary.

		£	s.	d.
	... per cwt.	0	10	3
	... ,,	0	0	6⅞
	... ,,	0	13	0
	... ,,	0	0	8
	... ,,	0	0	5
	... bottle	0	0	6
	... ,,	0	2	6
	... per lb.	0	0	2¾
	... ,,	0	0	2¼
	... ,,	0	0	4¼
	... ,,	12	0	0
	... per ton	4	5	0
	... ,,	3	10	0
	... ,,	4	0	0
	... ,,	2	5	0
	... ,,	2	0	0
	... per lb.	0	1	7
	... per ton	10	12	6
	... ,,	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3½
,, = 24°	,,	0	0	1⅞
,, Carbonate	,,	0	0	3½
,, Muriate	per cwt.	1	2	6
,, ,, (sal-ammoniac)	,,	34/- & 32/-		
,, Sulphate (grey), London ...	per ton	12	0	0
,, ,, (grey), Hull	,,	12	10	0
Aniline Oil	per lb.	0	0	10½
,, Salt	,,	0	0	9
Antimony...	per ton	38	0	0
,, (tartar emetic)	per lb.	0	1	2
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	3	10	0
,, Sulphate (native levigated) ...	,,	3	10	0
Bleaching Powder, 35 °/₀	,,	7	12	6
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	13	0	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 °/₀ f.o.b. Goole,	per unit per cwt.	0	1	3
Benzol, 90 °/₀ ,, ...	per gallon	0	3	0
,, 50 °/₀ ,, ...	,,	0	2	5
Carbolic Acid (crystallised 35°) ...	per lb.	0	1	3
,, (crude 60°)	per gallon	0	3	6
Creosote (ordinary)...	,,	0	0	1½
,, (filtered for Lucigen light)	,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	1	3
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ...	,,	0	13	6
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	40	7	6
,, Sulphate	,,	13	17	6
,, Oxide (copper scales)	,,	36	10	0
Glue	per cwt.	1	17	6
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	53	0	0
Iron (turnings)...	,,	1	13	0
,, Peroxide (blue billy)	,,	0	7	0
,, ,, (bog ochre)	,,	1	13	0
,, ,, (precipitated	,,	3	0	0
,, Sulphate (copperas)	,,	1	2	6
,, Sulphide (antimony slag)	,,	1	0	0
Lead (sheet) for cash	,,	13	0	0
,, Acetate (white)	,,	26	0	0
,, ,, (brown)	,,	19	15	0
,, Nitrate	,,	22	10	0
Lime, Acetate (brown)				
,, ,, (grey)				
Magnesium (ribbon and wire)				
,, Chloride ...				
,, Carbonate ..				
,, Hydrate ...				
,, Sulphate (Ep				
Manganese Sulphate				
,, Borate ..				
,, Ore, 70 °/				
Methylated Spirit, 60				
Naphtha (Wood), So				
,, ,, M				
OILS:—Castor				
Cotton-seed				
Linseed				
Lubricating, Scotch,				
Petroleum, Russian ...				
,, American				
Silver (metal)				
,, Nitrate				
STARCHES:—				
Sago				
Potato (farina)				
Sodium (metal)	per lb.			
,, Carb. (refined Soda-ash) 48 °/₀	per ton			
,, ,, (Caustic Soda-ash) 48 °/₀	,,	4		
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	5	
,, ,, (Soda Crystals)	,,	2	11	
,, ,, (Crystal Carbonate) ...	,,	5	6	3
,, Chlorate	per lb.	0	0	7½
,, Borate (Borax)	per cwt.	1	10	0
,, Bichromate...	per lb.	0	0	3½
,, Hydrate (74 °/₀ Caustic Soda)...	per ton	8	0	0
,, ,, (70 °/₀ Caustic Soda)...	,,	7	6	3
,, ,, (60 °/₀ Caustic Soda, white)	,,	6	6	3
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	3	9
,, Bicarbonate	,,	6	5	0
,, Hyposulphite	,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	9	0
,, Silicate (glass)	per ton	5	10	0
,, ,, (liquid, 100° Tw.)... ...	,,	4	10	0
,, Sulphate (Salt-cake)	,,	1	4	0
,, ,, (Glauber's Salts) ...	,,	2	2	6
,, Sulphite	,,	5	17	6
Potassium (metal)	per oz.	0	3	10
,, Bichromate	per lb.	0	0	4½
,, Carbonate, 90%	per cwt.	0	19	0
,, Chlorate	per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ...	per ton	23	5	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 °/₀	per ton	11	0	0
,, Muriate, 80 °/₀	,,	9	0	0
Strontium Hydrate, 98 °/₀	,,	7	15	0
Sugar, Beet	per cwt.	0	12	7½
,, Cane	,,	0	14	6
Sulphocyanide of Barium	per lb.	0	0	6
,, Ammonium	,,	0	0	9
Sulphur (Flowers)	per ton	9	5	0
,, (Roll Brimstone)	,,	5	10	0
Superphosphate of Lime (28 °/₀)	,,	2	0	0
Tallow	,,	30	0	0
Tin (metal)	,,	104	0	0
,, Crystals	per lb.	0	0	7
Zinc (Spelter)	per ton	14	12	6
,, Chloride (solution 96° Tw.)	,,	5	15	0

ATURDAY, AUGUST 27, 1887.

MR. J. T. BRUNNER, M.P.

lection as a Gladstonian-Liberal of Mr. John Tom-
runner for the Northwich Division of Cheshire by
tes against 3,983 polled for his Unionist-Liberal oppo-
ord Henry Grosvenor, restores to the chemical industry
ountry a special representative in the House of Com-
Mr. Brunner is the head of the firm of Brunner,
and Co. (Limited), who are manufacturers of soda by
ionia process at Northwich. Mr. Brunner was born
at Liverpool, in which city his father, the Rev. John
, followed the profession of a schoolmaster. Mr.
, sen., was a native of Zürich, in Switzerland, but
grated to England in 1832. The family was one of
st and most highly respected of the Swiss city, the
of Mr. Brunner's ancestors being recorded on the
rolls of Zürich as far back as 1292. Mr. Brunner,
ough brought up for the Lutheran Church, was never
l in it, having adopted Unitarian views. His first
ion in England was as teacher in Professor Voelcker's
t Everton, Liverpool, and he subsequently founded
ational establishment of his own at the same place.
of his pupils attained Parliamentary honours, among
ing Sir Bernhard Samuelson, Mr. W. Rathbone, the
Ion. James Stansfeld, Sir Charles Tennant, and Mr.
l Henry. Mr. Brunner, sen., retired from active life
, and died in 1883 at the age of eighty-two. Mr.
, jun., now again elected to Parliament, after having
ucated at his father's school, obtained in 1857, when
ears of age, a clerkship in the Liverpool branch of
Scholefield and Sons, of Birmingham. Here he
it is said, a salary of 20s. per week, and in 1861
l to Widnes, where he held a position with the late
utchinson. In 1872, having meanwhile made the
tance of Mr. Ludwig Mond, who had devoted much
o new experiments in soda manufacture, and in whose
y he had explored the Cheshire salt districts, Mr.
established business at Winnington as an alkali
turer, Mr. Charles Menzies Holland being also
ed in the partnership. The Winnington works, which
rchased from the late Lord Stanley of Alderley, did
rst succeed well, but in 1875 the tide turned, and an
unchecked prosperity commenced. The firm, since
nverted into a limited liability company under the
Brunner, Mond, and Co. (Limited), now own the
works of the kind in the world, and are the holders
ral patents bearing upon the manufacture of soda.
e at present the only firm in this country who manu-
soda by the Solvay process.

Brunner has long shown a deep interest in public
especially in educational questions. The free public
which he established at a cost of nearly £7,000, and
iently presented as a free gift to the town of North-
vas opened in July, 1885, by the Duke of Westminster,
son he has just defeated. Mr. Brunner has been twice
l—first to Salome, daughter of Mr. James Davies, of
ool; and, secondly, to Jane, daughter of the late Dr.
, of Kettering, Northamptonshire. At the general
of 1885 Mr. Brunner was returned by a majority of
over his Conservative opponent, Mr. W. H. Verdin,
mbers being respectively 5,023 and 3,995. In the
ng year, however, Mr. Brunner, who had spoken in
of Mr. Gladstone's Home Rule Bill and voted for its
reading, was defeated by Mr. R. Verdin, brother of
ner opponent, who stood as a Unionist-Liberal, by a
y of 658—3,758 votes being recorded for Mr. Brunner
416 for Mr. Verdin. The present contest has been
nent upon the death of this Mr. Verdin. Mr. Brunner
ibed by the *Times* as a millionaire and a "Chemical
." However this may be, it is certain that he is, in
t sense of the word, a self-made man.—*The Chemist
ruggist.*

ACTION AGAINST THE ST. HELENS COPPER WORKS COMPANY.

In the Nisi Prius Court, at Liverpool, on the 6th instant, Mr. Justice Smith had before him the case of Whitfield *v.* St. Helens Copper Company Limited. In this action the plaintiff, who is a farmer residing near St. Helens, sought to recover £46 damages for injuries to his crops by the smoke proceeding from the defendants' copper-smelting works. Mr. Mulholland appeared for the plaintiff, and Mr. Kennedy, Q.C., and Mr. T. Swift appeared for the defendant company.

The plaintiff stated that he had occupied his farm, situated near St. Helens, for fifteen years, and paid £40 a year rent. In 1881 he found that his crops were damaged by the smoke from the defendants' works, which lay about half a mile away from his farm. When there was a north-west wind the smoke came over the land and left a blueish scum on the crops. There were three copper works in the vicinity. When he calculated his damage in 1881 he sent in a claim for £10 to the defendants as one-third of his loss for that year. He saw Mr. Thompson, the company's manager, who promised to pay a proportion of the damage if the other works in the neighbourhood would do the same. Plaintiff's claim was not satisfied, and he entered the action in the St. Helens County Court, but by the action of the defendants it was removed to a superior court. The plaintiff now claimed for the damage caused each year since 1881.

Several farmers were called who gave evidence as to the damage done to the crops in the neighbourhood by the copper smoke.

A witness named Parr stated that he was employed occasionally as "smoke watcher." He had seen the smoke come from the defendants' chimney. He generally watched at night, when the atmosphere was lower; he had both tasted and smelled the deposit on the crops.

Mr. Kennedy asked the witness whether in 1871 he had not given evidence in seventeen cases, and all, except one, were lost.

Witness said that was so.

Mr. Kennedy: You gave evidence then; who lost them?

Witness: Why, the jury. (Loud laughter.)

Mrs. Hayes, who farmed land adjoining the plaintiff's, said that on making a claim to the company for damage to a crop of oats, they gave her £2. 10s. to compromise matters.

Mr. Kennedy objected to this fact being used as an argument in favour of the plaintiff's claim, as the defendants simply paid her this amount to avoid any further action, and because she was a poor woman. If the present claim was allowed there would be no end to similar claims, but if there were they would all be contested to the end. The defendants' works was one of eight similar copper works in the neighbourhood, and there were also several glass and alkali works, as well as brick and other works, from which quantities of sulphurous smoke were emitted. The defendants had lately spent £10,000 in making chambers for utilising the sulphur which had previously escaped from the chimney.

Mr. Thompson, the defendants' manager, stated that the firm had recently spent £10,000 in securing appliances to reduce the amount of smoke issuing from the works. He would admit that if the smoke did reach the plaintiff's farm it would damage the crops. His firm had ratified numerous claims, one of them as large as £47. 10s., but those claims were all those of poor people who pleaded poverty. It was simply done out of charity. The witness repeated the latter statement several times.

Mr. Mulholland read the names of a number of persons who had been paid by the Company in respect of damage done to the crops.

His Lordship: Do you, Mr. Thomspon, mean to stand up and say you paid this money out of charity?

Witness: I do. They came and pleaded poverty.

His Lordship: Gentlemen of the jury, if you believe that, you would believe anything.

Mr. Mulholland: They came and threatened you with action, and you paid.

His Lordship: And that is charity?

Witness, in reply to Mr. Mulholland, said that during the last ten years his firm had paid £90 in such claims, and it was very likely that in the ten years before that the company had paid £900 in satisfying such claims. The only two actions which were brought against them were lost by the plaintiffs, the company paying £13 and £19 into court respectively, the amounts being considered amply sufficient.

His Lordship, in summing-up, referred to the evidence of Mr. Thompson, and said he did not like men to think that jurymen were such idiots as to believe something which was absolutely impossible, though it was stated in a court of law. For a gentleman to get into the box and swear that ten years ago he might have paid £90, and the ten years before that again £900 for damage done by smoke, and expect them to believe it was done purely out of charity, was an insult to a special jury, and to the judge who was presiding in the court.

The jury found for the plaintiff, damages £25.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

XI. ALIZARINE COLOURS.

THE colouring matter of the madder *(Rubia tinctorum)* has been known from time immemorial, so remote indeed, that it would be difficult to name the true habitat of the plant itself. The cultivation of the plant in and about Smyrna, Adrianople, and the Isle of Cyprus has been chronicled by early historians, by whom it was called *Erythrodanon* and *Rubia*. At one time, not many years ago, vast plantations of madder existed in Zealand, Avignon in Alsace, Tunis and Morocco, Algeria, and various parts of Germany and Spain, but to-day practically the whole of this large agricultural industry has been superseded by reason of the introduction of artificial alizarine, a product manufactured from the anthracene of the coal-tar distiller, which, until a few years ago, was almost a waste article, and sold for a few pounds a ton as cart or wagon grease. In early days madder owed its importance to the beauty and fastness of the colours it was capable of producing, and to the fact that by a simple change of mordants used it was possible to produce shades of red, rose-pink, black, violet, lilac, puce, and other tints.

We have already in these pages referred to the early history of the artificial alizarine industry, and to its application with regard to wool dyeing, and therefore need not go over the ground again, but proceed to give a description of what the industry is to-day by reference to the exhibits relating thereto to be found at the Manchester Royal Jubilee Exhibition. The first case which strikes the observer's attention is that exhibited by the British Alizarine Company (Limited) of Silvertown, and there is but little doubt that the success that has attended this Company is due to the fact that five out of the six Directors are either turkey-red dyers, or calico-printers, or both. They are thus in touch with their consumers, and can render them valuable aid from a practical point of view.

As if to make the contrast between the old methods and the new more striking, the case contains specimens of the madder root, madder in powder, garancine, extract of garancine, and purpurine, all of which natural dyes have been supplanted by the alizarines. It has been stated that during the fifteen years ending 1870, the average annual value of our madder imports could not have amounted to less than one million sterling, and the quantity 23,000 tons. Since that date the extension of these artificial colouring matters has been so great that to-day Great Britain does not consume less than 4,000 tons of 20 per cent. alizarine per annum, the madder having been almost entirely replaced. According to the best authorities, a ton of of 20 per cent. alizarine paste is capable of doing the work of 18 tons of madder, so that by the introduction of artificial alizarine, the dyers and printers of the United Kingdom are saving at the very least three and a half to four millions sterling per annum. The artificial alizarine industry was commenced in Germany and England almost simultaneously, in this country by Messrs. Perkin Bros. in 1869. The works at Greenford Green, were in 1874 sold to Messrs. Brooke, Simpson, and Spiller, who, in 1876, turned them over to Messrs. Burt, Boulton, and Haywood, who considerably extended th to Silvertown, where larger works a large number of the alizarine c Kingdom were desirous of ensurir alizarine—a committee was formed c dyers of Manchester and Glasgov Messrs. Burt, Boulton, and Haywc their Silvertown works, where thi carried on by the British Alizarir exhibit we are calling attention.

A ton of 20 per cent. alizarine pas of 30 per cent. anthracene, such as in the case of the British Alizarine C 1s. 3d. per unit per hundredweigl necessary to make one ton of artificial or 2¼d. per pound.

This crude 30 per cent. anthrac creosote or light oil, so as to brin strength, and it is then sublimed in steam, specimens of each of these p The sublimed anthracene is next tr bichromate of potash and sulphuric is transformed into anthraquinone, s crude, purified, crystallised and subl on the floor of the case. The crude sulphuric acid, and boiled up with v the anthraquinone, and the precipitat with water, boiled with a solution dried, and finally sublimed. The transformed into sodium anthraquin at the same time the alpha and beta also present. The monosulphonat which we need not describe, yielc disulphonate flavopurpurine, and anthrapurpurine.

Only a few years ago all these proc curiosities, while to-day they are m their expensive nature renders it nec tions should be conducted in a ca manner. The exhibit of this compa mens of the three soda-salts above-n

Of the finished dyestuffs, we finc anthrapurpurine, and flavopurpurine purity: alizarine gives a blue shad yield yellow shades. We also fin here of alizarine orange or nitroaliz found that goods dyed with alizarir nitrous acid fumes to an orange colo the colour itself was made as a su alizarine makers. Alizarine orange and sulphuric acid, yields a blue co also shown as alizarine blue. In ad cial products, we find exhibited by and absolutely pure anthraquinone shaped yellow crystals (C_{14} H_8 O_2); splendid scarlet crystals; anthrapur flavopurpurine (C_{14} H_8 O_5), while anthracene (C_{14} H_{10}) is shown in a its pearly plates. Alizarine is not the intervention of mordar and for turkey-red dyeing as illustrated by the British work done with their al There are to be found stages of cotton printing being bleached, when n after steaming, after cle are also specimens in obtained with the sa purine, and flavopur of the case may be f and dyed cotton c various mordants fr of silk and wool c list of articles we view this exhibi

me in so short a time; ten years of application to the secrets of nature by the aid of chemistry has s more than all that has been done in the thousands before. While we were examining the contents of e, an elderly observer who was also looking on gly ventured the expression, Dear me! what a al science chemistry is; all these colours from coal- which we replied, Yea, Verily!

e concluding these remarks, we would add that the artificial alizarine was 2s. 6d. per lb. for 20 per cent. from 1881 to the commencement of 1883, it was uced to 1s. 10d., and to-day the price is *ninepence.*

(To be continued.)

WATER-GAS.

I.

N steam is passed through red-hot carbon a mixture nic oxide, carbonic acid, and hydrogen is produced, unt of carbonic acid varying according to the maxi- mperature to which the steam is subjected when through the glowing layer of fuel. If the tempera- ufficiently high, then no carbonic acid is formed, but bonic oxide and hydrogen, the theoretical composi- he generated gas being 50 per cent. of carbonic oxide per cent. of hydrogen. According to weight, its ge composition will be 96 carbonic oxide and 6 n. It is when the temperature sinks that carbonic formed, and at the same time proportionately less oxide, so that theoretically there finally is produced nsisting of 33 per cent. carbonic acid and 66 per drogen, or in weight percentage, 92 per cent. car- id and 8 per cent. hydrogen. According to experi- ade by Naumann and Pistor, carbonic acid when ver heated carbon commences to be decomposed into oxide at about 550° C., at 950° C. the transformation to about 94 per cent., whilst at 1,000° it is practically t. The same takes place in the case of steam when comes in contact with glowing carbon. At 500° C. ration into hydrogen and carbonic acid becomes t, while from 1,000° to 1,200° carbonic oxide and n only are formed. We must imagine the process in manner as to suppose that there occurs, first the nation of the steam into hydrogen and carbonic acid, a higher temperature becomes reduced to carbonic hen it comes in contact with the glowing coal. The power of carbon when burnt to carbonic acid amounts calories, on the other hand when burnt to carbonic ly 2,470 calories are developed, so that there is a loss 2,470 = 5,610 calories.

assume that this quantity of heat must be furnished surrounding coal, and that the same must only be lown by 400° at most, then there must be a coal tion (as the specific heat of the coal can be placed at he respective temperature) x × 0·46 × 400 = 5,610 x = 30·4. Consequently, about thirty times the of fuel, or eight kilos of coke per cubic metre of gas nite.

ubic metre of water gas contains half a cubic metre nic oxide and half a cubic metre of hydrogen, or 0·27 arbon and 0·403 kilo of steam. This 0·403 kilo of quires for its decomposition the same quantity of heat as arisen at the formation, or 1,523 calories. During lacement of the above 0·403 kilo of water, the liberated ms into carbonic oxide, by which means 648 calories free, so that the addition of heat necessary in the n of one cubic metre of water gas amounts to 648 = 875 calories. With reference to the heating f water gas, one cubic metre developes in round 3,000 calories, and roughly it may be said that while volume, namely, the carbonic oxide developes the of the heat, the half cubic metre of hydrogen the other half. The theoretical temperature d amounts to 2,839° C., *as compared with the burn-* ing of carbonic oxide to carbonic acid of 3,021° C., of hydrogen 2,649° C., consequently the temperature of water gas fuel is the mean of the two.

Although these temperatures serve well to illustrate the subject, it is necessary to mention that these numbers already cited are not strictly accurate, as they are based upon the assumption that the specific heat of steam and carbonic acid are constant at these high degrees of temperature. This is, however, decidedly not correct, at least so far as regards steam, as at 1,200° C., according to experiments made by Langen and Meyer this commences to be dissociated, while on the other hand carbonic acid is so permanent that even at 1,700° C. it does not suffer any noticeable decomposition. Now, as we must take into account in the calculation of temperatures a greater specific heat, it follows that the temperatures calculated for the combustion of hydrogen are too high, the greater the temperature there is. There are other decompositions which we cannot notice here on account of the lengthy explanations required, but which deserve attention from those who desire to use gaseous fuel as a source of heat.

If we now consider what apparatus is necessary for the production and efficient carrying out of the reactions already cited we shall find a generator is necessary, in which the fuel is alternately brought to a high temperature by means of a blast of air, so that a current of steam when passed through the glowing fuel may be decomposed into carbonic oxide and hydrogen. During the warm blast ordinary producer gas is being made, such as is manufactured in the ordinary Siemen's producer, whilst during the passage of steam, or as one might term it also, the cold blast, water gas is being formed. The characteristic of the water gas generator consists in this, that the same produces alternately ordinary generator gas and water gas.

America was the birthplace of water gas. In the Eastern portion of that continent no coal existed suitable for the purposes of the ordinary gas manufacture, but on the other hand large quantities of pure and cheap anthracite could be had, and also large quantities of petroleum refuse, combinations of which served for the production of illuminating gas. Anthracite is used in America in pieces about the size of an egg, while the water gas produced is used almost entirely for purposes of illumination after it has been carburetted with the petroleum refuse by being highly heated with it. This is accomplished by the aid of the apparatus devised by Grainger and Lowe; or by driving the water gas through a series of highly heated retorts into which the hydrocarbons have been introduced, devised by Tessie du Motay; or, thirdly, by previously heating the steam in the regenerator, and then mixing with heavy hydrocarbons and driving them together through the glowing coal, in which method the evaporation of the hydrocarbon and the carburisation of the water gas take place simultaneously. This is the so-called Strong process.

THE TWENTY-THIRD ALKALI ACT REPORT.

VI. SALT-WORKS.

FOLLOWING the plan already adopted of treating the Chief Inspector's remarks upon the various departments before dealing with those of the district inspectors, we have failed to find any important allusion to salt-works in the early part of the report; but on page 103 the small Scottish works are described as being ten in number, and that in all of these, rock-salt is dissolved in water (sea water) and the brine so produced clarified and evaporated The Chief Inspector states that there is no trace of damage, and that the manufacturers complain strongly of having to pay the "tax."

During 1886, it appears that there have been 10,600 tons of salt manufactured in Scotland, and judging from the amount of fuel required for this process in other parts of the country about 5,000 tons would be consumed, or on an average about 100 tons a week, so that the apparent harmlessness of this manufacture in Scotland must be taken as due to the small quantity of coal consumed. There seems to have been no tests made of the acidity of the chimneys, into

which the fire gases of these processes were entering; but judging again from figures supplied by the other inspectors, we feel our readers will agree with us that salt-works cannot escape although they "complain strongly of having to pay the tax."

However small an alkali works is, it is bound to keep down the escape of muriatic acid to within 0·2 grain per cubic foot of gases escaping by the chimney, and if this is so with them the same rule should also apply to salt-works. Mr. Jackson, in district No. 5, gives us some results of the examination of salt-works' chimneys, and from his figures we gain the information that the total acidity per cubic foot of smoke averages 0·34 grain per cubic foot, and in the same volume of gases there was found 0·049 grain of hydrochloric acid; but his figures also show that there is a great variation in the amounts given off at various times, a fact alone justifying the retention of this particular trade in the schedule. Taking the amounts of hydrochloric acid found by Mr. Jackson, we find quantities as low as 0·01 grain per cubic foot, to as high as 0·13 grain, a number above the average found in all the alkali works for the year. This comes about from leaky pans, the salt getting down into the flues becomes acted upon by the sulphurous acid and oxygen—Hargreaves' process being in fact performed in miniature.

A similar tale is told of district No. 3 by Mr. Ballard; the average acidity of the chimneys of the fifty-seven salt-works in his district is 0·67 grain, and of the hydrochloric acid 0·07; but, whilst his lowest test is 0·01 grain, his highest is that of the utmost amount allowed by the Act for alkali works, namely, 0·20, so that there is no wonder that vegetation suffers in the vicinity of these works. Some of the numbers given by Mr. Ballard are extremely interesting:—1,418,200 tons of white salt were produced during 1886, and the quantity of fuel required to produce this was 756,400 tons. From this it appears that a ton of fuel evaporates almost four tons of water, an extremely small duty, so that the salt manufacturers have yet much to learn in the way of economical fuel consumption. It is here stated that the acids from the coal smoke amount to no less than 67,275 tons, nearly the whole being evolved in the Northwich and Winsford district, 29,000 in the former, and 36,000 in the latter. This amount of sulphur acids being evolved in such limited areas, there can be no wonder at the amount of destruction to vegetation which annually occurs; but at the same time it must be remembered that coal smoke is specially exempted from interference on the part of the inspectors, and it may go unchecked until such time as the legislature steps in to prevent it by new Acts of Parliament. Freedom from black smoke does not mean absence of damage from sulphur acids, and this should be taken well to heart by those who are endeavouring to suppress the former evil.

The inspector for No. 2 district, North Yorkshire and South Durham, corroborates the reports of his colleague in Cheshire, the hydrochloric acid was found to be 0·11 grain per cubic foot, and the sulphur acids amounted to 0·75 grain. It appears that the output of salt in this district amounts only to about 3,400 tons weekly, or an increase of 70 per cent. on last year, so that the industry is a growing one, and unless something is done to restrain the damage which all these works do, devastation may proceed quite as rapidly in North Yorkshire as it has done in Cheshire.

What the salt manufacturers have to do in the future is to give up their crude methods of evaporation, or more properly speaking, brine boiling, and to get an evaporation of ten pounds of water per pound of fuel, which ought easily to be attained. There is no doubt from our own personal experience of the salt districts that the workmen would resent any interference with their ancient methods of manufacture, and this alone is sufficient to deter all but the bravest from endeavouring to introduce improvements.

THE SCOTCH OIL COMPANIES.

Some important work was got through at the meeting on e 19th inst. of the Scottish Mineral Oil Trade Association. The agreement as to the selling price of burning oil each company has bound itself under a smart pena dispose of its oil below the figures some time ago a was signed by all present; and Dr. W. G. Bl president of the Chamber of Commerce (Mr. D. and Mr. Campbell White were named as arbiters bargain. The letter lately received from the Sta Company of America as to the selling price of scal sidered, and, after some conversation, a comn nominated to go fully into the whole subject, as actual production in this country, and consider wha can be devised for raising, in conjunction with the Company and the other producers in the States, th scale. As a result of the success which has at agreement come to on the burning-oil question, th strong opinion expressed that some such scheme sh once adopted as respects scale, but ultimately it w to leave the matter in the hands of the committee, look into details and report immediately. These c of representatives are beginning to bear good f trade. The intercourse and interchange of views a the several companies to see more clearly than the much of identity of interest there is in their econo the feeling grows, as there is every reason to b gain will be common to the general body of shareh was also determined at the meeting to abide resolutions as to insisting on reductions of wages. ment submitted showed, we believe, that prod been lessened this year by about 70 per cent., and telling perceptibly on stocks and relatively on pric products are very scarce already.

THE BRITISH PHARMACEUTICAL CONF

During the meeting of the British Associatio chester, the Pharmaceutical Conference will be h same place, under the presidency of S. R. Atkins, A large number of distinguished pharmacists are e be present, and in addition to the usual attracti annual meeting, the reading and discussion of p the means of friendly intercourse will, it is hoped, gathering increasingly popular. The Chemical the Exhibition is a quite sufficient treat for ma visitors, while the display of machinery of all afford a better insight into special manufactures be otherwise obtained. The following arrangeme the week have already been made:—Monday, Au There will be a reception by the President at Hotel, at 8 p.m., to be followed by a con Tuesday: The President will deliver his addr Chemical Lecture Theatre at Owens College, at after which the reading and discussion of pape proceeded with, Mr. Allen, of Sheffield, having p interesting communication on disinfectants. Afte in the college grounds at 1 p.m., the reading and of papers will be resumed, and at 4 p.m. car be in attendance to convey the visitors to the Wednesday: The reading of papers will again be at Owens College, but the chief feature of the day smoking concert at the Grand Hotel, at 9 p.m. An excursion will take place to Matlock, where Tor, the Caverns, and Roman Mines will be party returning in the evening by special train to M

This is a special age for Associations and combina meetings whereby members can exchange views trade topics, in which there always is plenty of sc resort to rings, caucuses, and corners, so largely i by our friends across the water. The meeting pro a very successful one, and we hope the visitors away with them pleasing remembrances of th Manchester.

New Zealand Antimony Company L Capital, £250,000 in £1 shares. Formed to acq leasehold lands at Endeavour Inlet, near Charl New Zealand.

SPECIAL NOTICE.

The favour already accorded to **The Chemical Trade Journal** is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, **the Organ** of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

DAVIS & CO.,

CHEMICAL TRADE JOURNAL OFFICE,

42, JOHN DALTON STREET, MANCHESTER.

Also that communications relating to the Editorial or Business Departments of the Journal be endorsed "EDITOR" or "MANAGER," as the case may be.

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It will thus be seen that *The Chemical Trade Journal* offers unusual facilities for bringing trade announcements under the notice of a large and important class of buyers, and when it is added that the tariff for advertisements is not an expensive one, the advantages of this department of the Journal will be apparent to all those who seek to extend their business by that indispensable aid to nineteenth century enterprise and success, viz., **judicious advertising.**

Correspondence.

THE MANUFACTURER IS AT FAULT.

To the Editor of the Chemical Trade Journal.

Sir,—I have read with interest the correspondence which has appeared in your columns between "Menenius" and others.

There can be little doubt that the blame of the admittedly bad state of affairs lies entirely with the manufacturers, who, being in the position of employers, are responsible for the quality of brains no less than for that of the manual labour and machinery in their employ. Yet how often do we find manufacturers of otherwise sound business ideas going astray in their selection of a chemist, and thinking to get as much value for a salary of £50 as they might reasonably expect for three or four times that amount if trained knowledge and experience are to count for anything. An immediate saving of two or three pounds a week is, of course, very evident; but soon the day of reckoning comes, and there is loss of production, deficient quality of goods, trouble with customers, and loss of business, while to crown all, just as the unwelcome truth begins to make itself known and felt, comes the unlucky youth to ask for a "rise." This the manufacturer considers really too much, after the expense of training him, but the youngster, thinking otherwise, transfers his services to some more remunerative field, repeating the process at the first favourable opportunity, until at last he has gained sufficient experience to enable him to settle down into a comfortable berth.

By this roundabout method a considerable number of our English chemists obtain all the knowledge they ever possess, and become qualified for the routine work of the laboratory, or the superintendence of manufacturing processes, but not one in fifty of such ever thinks of such a thing as independent study or research, or makes an observation worth mentioning, much less an invention or an improvement likely to benefit his profession.

Continental manufacturers, on the other hand, having natural facilities mostly inferior to our own, have long since realised that their only chance of successfully competing against us lay in economising the use of raw materials, utilising waste products, and perfecting the quantity and quality of the output. To attain these ends they found it necessary that skilled chemists should be employed, and that even the foremen in charge of departments and the leading hands should have sufficient technical training to render them capable of discharging their duties in an efficient intelligent manner. A striking contrast to our own system, by which, between half-trained chemist, pig-headed foremen, and ignorant workmen, many manufacturers allow themselves to go to the dogs, and many more are in a state of perpetual worry and anxiety.

We have followed rule of thumb and neglected the principle of exact scientific method until we have come to imagine that science and practice are two different things, and that what is true of the one is not so of the other, so much so that there is always a great deal of prejudice to be overcome before a new or improved principle can be introduced, or an erroneous practice dispensed with.

We never hear our doctors, lawyers, or other learned professions classed as inferior to those of other countries, because it has always been recognised that a considerable degree of skill and learning should be shown before any candidate was allowed to exercise his calling. In industrial matters, however, capital and labour have for a long time been regarded as the only essentials, and although the more intelligent portion of our countrymen are certainly beginning to see that we are on the wrong track, I am inclined to think that unless our good fortune specially favours us we shall be a good deal nearer to our threatened ruin before our much needed technical schools are in such a state of efficiency as to give an ample supply of thoroughly reliable chemists,—men who know how to test anything likely to be put in their way;

who have a fair idea of what raw materials, finished goods, productions, and costs mean; who can write out a chemical equation; do not need showing how to work out decimals and simple measurements; and who have studied the literature of the processes they intend to work at, so as to know beforehand what difficulties are likely to be met with and how they can best be overcome, in what directions improvements have been made, and where to look for the possibility of further advance.

Then we shall be able to direct our own forces to better advantage. A man will not require to spend half a lifetime in gathering that experience which is to the investigator the true starting point of his career, from which to carry on the work of study and research, of invention and discovery.

Then we shall see something of progress, good trade, new industries, no waste, no loss, no nuisance; and last, but perhaps not least, we shall no longer have to deplore the existence of "Carboy, Tub, and Stink."

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The seventy-first quarterly meeting of this institution will be held at the Royal Jubilee Exhibition, Manchester, on Saturday, the 27th inst., under the presidency of Mr. Thomas Moore, of Macclesfield The members assemble under the Central Dome at 11 a.m., and will proceed to inspect the various chemical exhibits until 12-30 p.m., when luncheon will be served in the Palm House. After luncheon, the members are to be left free to inspect the other exhibits, meeting at 3-30 in the Palm House for transaction of ordinary business. After a few introductory remarks by the President, a descriptive lecture on the Chemical Section of the Exhibition will be delivered by Mr. Watson Smith, having special reference to the products connected with the gas industry. Mr. Watson Smith is the vice-chairman of the Chemical Section of the Exhibition, and it was almost entirely by his knowledge and exertions that the splendid series of chemical exhibits were got together. At 5 p.m. the members will dine together in the Palm House, after which they will proceed to view other parts of the building.

As the committee have issued a special whip there is no doubt the meeting will be a large one, as the exhibits at the Exhibition should be specially interesting to gas managers.

Notes and Queries.

Messrs. Brunner, Mond, and Co.—The half-yearly meeting of the shareholders of Brunner, Mond, and Co., alkali manufacturers, was held in Liverpool, on Friday, August 19th, Mr. H. Coghill presiding. The report of the directors showed a balance to the credit of profit and loss account on the working of the half-year of £87,756 10s. 2d., which, with £34,451 9s. 11d., brought forward from the previous half-year, makes a total of £122,208. The directors proposed to deal with the balance as follows:—Dividend on preference capital at 7 per cent. per annum, £10,850 18s; dividend on ordinary capital at 25 per cent. per annum, £67,812 10s.; amount to be written off patents account, £7,500; balance carried forward, £36,044 11s. 9d. On the motion of the chairman, seconded by Mr. W. H. Anderson, the report was adopted. Mr. T. W. Read was re-elected auditor.

The Iceland Sulphur and Copper Co.—Mr. Benjamin Newstead (Messrs. Lovering and Co.), chartered accountant, has, with the consent of Mr. Justice Kay, declared a first dividend of 5s. in the pound to the creditors of the Iceland Sulphur and Copper Company Limited, and the same is payable at his offices, No. 77, Gresham-street, City, on and after the 23rd inst.

The Kimberley Diamond Mining Company have received the following cablegram from the company's office at Kimberley:—"During first fortnight in August, Blue Ground hauled 44,000 loads; washed 35,000 loads; estimated value of diamonds found, £48,000."

Messrs. William Younger and Co.—Another important and old-established brewery company has been converted into a private limited company, namely, that of William Younger and Co., of the Abbey and Holyrood Breweries, Edinburgh. The existing partners, Mr. Henry J. Younger, Mr. Andrew Smith, and Mr. Alexander L. Bruce, take the whole of the ordinary shares, and they with their staff and friends also take up the preference shares. No part of the capital will be offered to the public.

Welsbach and Williams Limited, has been registered with a capital of £40,000 in £1 shares for the purpose of carrying on business as manufacturing chemists and metallurgists, and as an electric light and power company in all branches, but chiefly to purchase an invention of Dr. Carl Auer von Welsbach for the manufacture of incandescent lights, and the business carried on in connection therewith at 25, Theresinam Gasse, Vienna, and at 6, Jeffrey's Square, St. Mary Axe. Mr. Williams is appointed managing director for five years at a salary of £500 per annum, and will also be entitled to 10 per cent. of the realised net annual profits, subject to their prior payment of 20 per cent. of such profits to Mr. Welsbach.

A Combustible Cargo.—The *City of Montreal* had on board 2,031 bales of cotton, 5,011 boxes of cheese, 1,906 boxes of bacon, 575 boxes of canned goods, 200 tierces of lard, 183 tierces of pork, 100 half-barrels tongues, 50 half-barrels of lubricating oil, 1,580 barrels of lubricating oil, 45 barrels of cottonseed oil, 33 hogsheads of tobacco, 78 half hogsheads of tobacco, quantity of fresh meat, 5,658 bags of copper matte, 1,000 bags of flour, 1,000 shooks, 4,161 staves, 63 barrels of beef, 9 barrels of bladders, 433 tubs of butter, 337 sundry packages, and 39 empty barrels.

A New Russian Ironworks.—The Russian Government has just announced its sanction of the articles of association of a company of Russian and foreign capitalists formed to establish large metallurgical works in South Russia. The company starts with a capital of half a million sterling, which will be increased to three times that amount as its operations develope. The Russian capitalists are two, Prince Tenisheff and M. Liasky, the remaining six being nearly all Frenchmen. The company has already purchased iron mines in the Ekaterinoslav district, where it will establish works for rolling steel rails and manufacturing armour plates. The Russian Government has promised it contracts sufficient to keep it in work for more than a year, mainly for the naval establishments in the Black Sea.—*Engineering.*

Ruby Mines.—With reference to a Rangoon telegram published by a London paper on the 20th ult., to the effect that the revenue now received by the Indian Government from the Ruby Mines was satisfactory and would probably largely exceed the rent payable under the proposed lease, it is stated on good authority that the Government are receiving less than 1,200 rupees monthly from this so[illegible] although 706 licences to dig in the mines have bee[illegible] granted to [illegible]llers in the district.

Fires.—On the 17th inst. [illegible] Plymouth was the scene of a second disastrous fire, which [illegible] broke out about two o'clock in an aerated water manufact[illegible]ry in Kinterbury-street, and extended to Watt's large ra[illegible] stores, which were entirely destroyed. A manufactory c[illegible] two floors 40ft. by 17ft., a Point Pleasant, Wandsworth, [illegible] belonging to Messrs. Hamilto and Co., manufacturing chem[illegible]sts, was also destroyed by fi on the same date, together wi[illegible]h its contents.

The Manchester Ship[illegible] Canal Company. — Th Mersey Docks and Harbour [illegible] Board have had perforce accept a proposition emanat[illegible]ing from the Manchester Sh Canal Company. The latter [illegible] having become owners of t property of the Bridgewater [illegible]avigation Company, natural adopts the arrangements an[illegible]l assumes the responsibiliti attaching to the purchase, [illegible]nd amongst others a lightera service performed on behalf o[illegible]f the Dock Board. At a mee ing of the Board on the 18th [illegible] inst. a letter from the Can Company was read, offering to continue the service on th same terms as those previously paid, and the offer wa accepted. Business relations between the two vast interest have thus commenced in a most amicable spirit.

Defries Safety Lamp and Oil Company Limited. The second ordinary general meeting of this Company was held at the Cannon-street Hotel on the 12th inst. The report stated that the net profits, after all deductions had been made, were £2,658. 9s. 8d., out of which an interim dividend of £2,485. 3s. 3d. had been paid; and it was now proposed to carry forward the balance of £173. 6s. 5d. to the next account. In moving the adoption of this report, the chairman said he was sorry that the profits, good as they undoubtedly were, were not a little more. This might be contingent on the fact that at the commencement of the Company's business it was not sufficiently organised as to be able to carry on the business as economically as they would have liked. They were not settled in the new premises before they were literally deluged with orders. In consequence of the really splendid development of business and the want of space, negotiations had been instituted for a large warehouse in Farrington-road, which would materially help on the development of the Company's trade.

The Drought.—Mr. G. J. Symonds, F.R.S., sends to the *Times* the following figures referring to all the partial droughts of late years equal to or exceeding 1887:—

Year.	Began.	Ended.	Duration.	Fall during period. In.
1840	June 30	Aug. 9	41	0·00
1844	April 13	May 28	45	0·15
1844	Nov. 15	Dec. 27	43	0·06
1847	June 24	Aug. 4	42	0·25
1852	Feb. 10	Mar. 28	48	0·16
1854	Feb. 16	April 21	35	0·25
1864	July 4	Aug. 19	47	0·24
1865	Aug. 24	Oct. 7	45	0·03
1869	June 16	July 31	47	0·20
1887	June 4	July 15	42	0·25

It is, therefore, eighteen years since the above partial drought was equalled, and it is more than forty years since the June absolute drought of thirty days in part of Sussex was equalled.

The Convention of German Soda Manufacturers. The firms which belong to the above syndicate are the Deutsche Solvay-Werke in Bernburg, the Chemische Fabrik Buckau in Magdeburg, Rob. Suermont and Co. in Bontwy, the Nürnberger Sodafabrik, Engelcke and Krause-Trotha, the Rothenfelder Salinen-und Soolbad-Actiengesellschaft in Rothenfelde, the Actiengesellschaft Georg Egestorff's Salzwerke in Linden, and the Chemische Fabrik Schöningen, in Schöningen. The syndicate hopes to succeed sooner or later in establishing a universal German soda association in the interest of all the manufacturers. At any rate the articles of association at present adopted leave it open to the works which have not yet joined to become members when they please.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday Morning.

Without any set bettering of prices, Scotch chemicals are yet experiencing a slightly improved inquiry as a general rule. Soda ash and caustic soda show some amendment, and the local demand for bleach is a fair although not a pressing one. As regards certain special lines there has to some extent been a revival in foreign orders, but on the contrary West of Scotland makers of bichromates (potash and soda both) complain of an unmistakable slackness of call, particularly on the part of English home-market consumers. Deadlock still prevails in the paraffin manufacture; stocks in hands of makers and dealers consequently dwindle, and on a necessarily disorganised market, with much of the season's forward contract making already signed and settled, little is passing in the speculative sense. Undernoted quotations (as regards this section) are therefore, for the most part, of nominal significance only. Sulphate of ammonia is certainly slightly weaker, owing partly to the inopportune season of the year, but its market position is, relatively, not unhealthy.

Current quotations are:—Soda crystals, £2. 6s., net Tyne; alum (lump), £4. 17s. 6d., less 2½ °/₀ Glasgow; borax, English refined, £31, and boracic acid, £46, net Glasgow; soda ash, 48/52° 1d., less 11 °/₀ Tyne; caustic soda, white, 76°, £9. 5s., 70/72°, £7. 10s., and cream, 60/62°, £6. 5s., less 2½ °/₀ Liverpool; bicarbonate of soda, 5 cwt. casks, £6, and 1 cwt. casks, £6. 5s., net Tyne; refined alkali, 48/52°, 1⅛d., less 5 °/₀ Tyne; salt-cake, 23s. 6d. to 24s.; bleaching powder, £7. 15s., less 5 °/₀ on rail, Glasgow; bichromate of potash, 4½d., and bichromate of soda, 3½d., less 5 °/₀ f.o.b. Glasgow; nitrate of soda, 8s. 9d.; chlorate of potash, 6d., less 5 °/₀; sulphate of ammonia, £12. 5s. to £12. 7s. 6d., f.o.b. Leith; paraffin scale, 1½d. to 1⅞d., wax 120° (good semi-refined), 2d. to 2⅜d., spirit, 6¾d. to 7d., and burning oil, 5d. to 5½d. per gallon (according to quality), Scotch consumption selling to English and Irish a shade less; sulphate of copper, £13. 15s. less 4 °/₀ Liverpool. Chemical imports and exports at Ayrshire harbour practically *nil* for the week. Of sugar, 22,464 bags have been landed at Greenock; and at Glasgow, from New York, 500 barrels sugar, 704 barrels oil, and 2,808 barrels rosin; and from Archangel, of pitch and tar, 200 and 935 barrels respectively.

THE TAR PRODUCTS MARKET.

There is every indication that the remarks in our last issue are proving correct. Benzol is if anything weaker, in spite of the efforts which are being made to keep up its value; when the fall does come it will be with a crash. We have heard from the continent that sales of 90's benzol have been made at 2s. 9d., and 50/90's at as low a price as 2s. 4d., and it is quite certain that 2s. 10d. for 90's and 2s. 5d. for 50/90's cannot be realised in Manchester. Anthracene and carbolic acid keep improving slightly, so that it has been stated it pays better to sell anthracene than make alizarine.

THE SULPHATE OF AMMONIA MARKET.

The markets have dragged wearily along during the whole week, buyers showing but little desire to come forward. In fact they have been led to believe that cheaper values would rule in the near future, and that they would be acting wisely by waiting. Stocks are not increasing, the home-trade is growing rapidly, more and more ammonia is being used for soda-making and other purposes, so there is no fear of a glut in the market. Last week's shipping returns show that a fair quantity was shipped from all the principal ports, and the autumn demand will soon be upon us. We are glad to report that the market closes firm, and values may be taken as—London, £12. 10s.; Beckton, £12. 2s. 6d.; Hull, £12. 12s. 6d. to £12. 13s. 9d.; Leith, £12. 10s.

THE PATENT LIST.

The following list has been compiled expressly for The Chemical Trade Journal *by* G. F. Redfern & Co., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

11022. T. Nixon. For an improved valve for water, steam, or other fluids, and especially suitable for acids. August 12.

11024. G. Gourlie (a communication from T. Bell, of Auckland). For an improved lubricating oil and the method of manufacturing the same. August 12.

11156. T. T. Mathieson and J. Hawliczek. For improvements in the manufacture of caustic soda and caustic potash from their respective sulphates, the recovery of certain by-products therefrom, and apparatus employed therein. August 16.

11268. G. A. Jarvis. For the manufacture of sodium and potassium. August 18.

11274. J. S. Rigby. For improvements in the treatment of lime, mud, and like substances to obtain whiting and cement, and in apparatus therefor. August 18.

OUR PRICE CURRENT.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

[illegible] are F.O.R. at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.

	£	s.	d.
Acids			
,, Acetic, 8s ... per cwt.	0	10	3
,, ,, Glacial ... per lb.	0	0	6⅞
,, Arsenic ... per cwt.	0	13	0
,, Chromic ... per lb.	0	0	5
,, Fluoric ... ,,	0	0	5
,, Muriatic (Lower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	6
,, Nitric, 80° Tw. ... per lb.	0	0	2¾
,, Nitrous ... ,,	0	0	2½
,, Oxalic ... ,,	0	0	4½
,, Sulphuric (fuming 40 %) ... ,,	12	0	0
,, ,, (Brimstone 168°) ... per ton	4	5	0
,, ,, (Pyrites 168°) ... ,,	3	10	0
,, ,, (spent oxide 168°) ... ,,	4	0	0
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ,,	2	0	0
,, Tartaric ... per lb.	0	1	7
Alcohol, white powdered ... per ton	10	12	6
Alum ... ,,	4	15	0
Ammonia, Strong 48° ... per lb.	0	0	3½
,, ,, 44° ... ,,	0	0	1¾
,, Carbonate ... ,,	0	0	3½
,, Muriate ... per cwt.	1	2	6
,, ,, (sal ammoniac) ... ,,	34/- & 32/-		
,, Sulphate (grey), London ... per ton	12	7	6
,, ,, (grey), Hull ... ,,	12	12	6
Antimony Oil ... per lb.	0	0	10½
,, Salt ... ,,	0	0	9
Antimony ... per ton	35	0	0
,, (tartar emetic) ... per lb.	0	1	1
Barium Chloride ... per ton	7	10	0
,, Carbonate (native) ... ,,	4	0	0
,, Sulphate (native levigated) ... ,,	3	10	0
Bleaching Powder, 35 % ... ,,	7	12	6
,, ,, Liquor, 7 % ... ,,	2	12	6
Bisulphide of Carbon ... ,,	13	0	0
Coal Tar Dyes.			
Alizarine (artificial) 20% ... per lb.	0	0	9
Magenta ... ,,	0	3	9
Coal Tar Products.			
Anthracene, 40 % Cash, Goole, per unit per cwt.	0	1	3
Benzol, 90 % ,, ... per gallon	0	2	9
,, 90 % ,, ... ,,	0	2	4
Carbolic Acid (crystallised 35°) ... per lb.	0	1	2
,, (crude 60°) ... per gallon	0	3	6
Cresylic (ordinary) ... ,,	0	0	1½
,, (refined for Lucigen light) ,,	0	0	2
Crude Naphtha, 90 % @ 120° C. ,,	0	1	3
Creosote Oil, 44° Tw. ... per ton	1	7	6
Pitch, Coke Liverpool or Garston ... ,,	0	13	6
Coke oven Oils (crude) ... per gallon	0	0	1½
,, ,, (distilled) ... ,,	0	0	2
Copper (British Cake) ... per ton	40	12	6
,, Sulphate ... ,,	14	0	0
,, Chloride (copper scales) ... ,,	36	10	0
Cobalt ... per cwt.	1	17	6
Glycerine (crude) ... per ton	33	0	0
,, (refined) ... ,,	53	0	0
Iron Turnings ... ,,	1	13	0
Ferrocyanide (blue billy) ... ,,	0	7	0
,, (yellow) ... ,,	1	13	0
,, (precipitated) ... ,,	3	0	0
,, (Cameron) ... ,,	1	2	6
,, (antimony slag) ,,	1	0	0
[illegible] ...	13	0	0
[illegible] ...	26	0	0
[illegible] ...	19	15	0
[illegible] ...	[illegible]	10	0
[illegible] ,,			

	£	s.	d.
Lime, Acetate (brown) ... per ton	9	17	6
,, ,, (grey) ... ,,	13	15	0
Magnesium (ribbon and wire) ... per oz.	0	2	6
,, Chloride ... per ton	2	5	0
,, Carbonate ... per cwt.	1	17	6
,, Hydrate ... ,,	0	10	0
,, Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... ,,	19	10	0
,, Borate ... per cwt.	2	5	0
,, Ore, 70 % ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... per gallon	0	2	4
Naphtha (Wood), Solvent ... ,,	0	4	3
,, ,, Miscible, 60° O.P. ... ,,	0	5	6
Oils:—Castor ... per cwt.	1	4	6
Cotton-seed ... per ton	21	10	0
Linseed ... ,,	23	0	0
Lubricating, Scotch, 885°—890° ... ,,	5	17	6
Petroleum, Russian ... per gallon	0	0	5½
,, American ... ,,	0	0	5½
Silver (metal) ... per oz.	0	3	8½
,, Nitrate ... ,,	0	2	8
Starches:—			
Sago ... per cwt.	0	8	9
Potato (farina) ... ,,	0	10	3
Sodium (metal) ... per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 % per ton	5	5	0
,, ,, (Caustic Soda-ash) 48 % ,,	4	0	0
,, ,, (Carb. Soda-ash) 48 % ,,	4	2	6
,, ,, (Soda Crystals) ... ,,	2	13	9
,, ,, (Crystal Carbonate) ... ,,	5	8	9
,, Chlorate ... per lb.	0	0	7½
,, Borate (Borax) ... per cwt.	1	10	0
,, Bichromate ... per lb.	0	0	3½
,, Hydrate (74 % Caustic Soda) ... per ton	8	0	0
,, ,, (70 % Caustic Soda) ... ,,	7	6	3
,, ,, (60 % Caustic Soda, white) ,,	6	6	3
,, ,, (60 % Caustic Soda, cream) ,,	6	3	9
,, Bicarbonate ... ,,	6	5	0
,, Hyposulphite ... ,,	5	5	0
,, Nitrate (95 %) ex ship Liverpool per cwt.	0	9	0
,, Silicate (glass) ... per ton	5	10	0
,, ,, (liquid, 100° Tw.) ... ,,	4	7	6
,, Sulphate (Salt-cake) ... ,,	1	4	0
,, ,, (Glauber's Salts) ... ,,	2	2	6
,, Sulphite ... ,,	5	17	6
Potassium (metal) ... per oz.	0	3	10
,, Bichromate ... per lb.	0	0	4½
,, Carbonate, 90% ... per cwt.	0	19	0
,, Chlorate ... per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ... per ton	23	0	0
,, Nitrate (refined) ... per cwt.	1	2	0
,, Prussiate Yellow ... per lb.	0	0	7½
,, Sulphate, 90 % ... per ton	11	0	0
,, Muriate, 80 % ,,	9	0	0
Strontium Hydrate, 40 % ... ,,	7	15	0
Sugar, Beet ... per cwt.	0	13	3
,, Cane ... ,,	0	17	0
Sulphocyanide of Barium ... per lb.	0	0	6
,, Ammonium ... ,,	0	0	9½
Sulphur (Flowers) ... per ton	9	5	0
,, (Roll Brimstone) ... ,,	5	15	0
Superphosphate of Lime (28 %) ... ,,	2	0	0
Tallow ... ,,	24	10	0
Tin (metal) ... ,,	103	10	0
,, Crystals ... per lb.	0	0	7
Zinc (Spelter) ... per ton	14	12	6
,, Chloride (solution 96° Tw.) ... ,,	5	15	0

TURDAY, SEPTEMBER 3, 1887.

: FUTURE OF THE BENZOL MARKET.

we predicted a few weeks ago the fall of 90's half-a-crown a gallon, certain tar-distillers whose too well known to mention here, expressed them- y strongly to our friends regarding the statement we e interest of our readers, constrained to make. nted out the necessity of burning tar largely in the which it is produced, without which precaution, the cts trade is going to be in a very bad way. The tent to us, though perhaps in a lesser degree to at benzol is going to be produced in very much antities than were produced last year, and if, as said there was, a glut occurred last year which enzol down to 1s. 5d. per gallon, how much more will be experienced before next April, and how will affected thereby?

not wish to play the *role* of prophets, but we ven- row out the hint, that unless something is done a e energetically than has been followed of late by the ers themselves, that before six months are over 90's ll be selling at one shilling per gallon. Yes! ONE per gallon.

aware that the publication of our opinions are cause great displeasure in many quarters, the more ly as there is every reason for assuming them to be ounded on a safe basis, and therefore in anticipating may be some still unwilling to listen to our preach- ve the reasons which have compelled us to form ions. Our readers may rest assured that no amount n on our part, without it is actually founded on have any effect on prices; our intentions are always e our readers that they may not be caught in the e speculator, by giving them a *resumé* of the past ef glance of the future, on matters to which they ittle time to devote their attention.

year 1885 more benzol was produced than in 1886. rmer year all the carbonising works were in full sides which some 8,000,000 tons of coal were l for the purpose of making illuminating gas. In manton was the only carbonising plant working to apacity, and though the value of 90's benzol had to 1s. 5d. per gallon, f.o.b. Goole, casks free, it has d on several occasions that the operations were at a profit. In the opinion of those best calculated opinion of the actual cost of benzol when made as ive article, the statements of *profit* must be received great caution, coal, especially small coal, is such a e market that some colliery proprietors are glad to of the way at any price. If the coal trade should risk again, as it was some years ago, the aspect entirely changed.

nsumption of coal-gas this year will probably be t consumed during last year, and though as much e produced, gas engineers are more alive to the of obtaining the maximum yield per ton of coal, is more eagerness now than heretofore in extracting luminating matter as possible from the tar.

the yield of tar per ton of coal as being 12 gallons, tons would produce 96,000,000 gallons, or not less 000 tons. If we estimate the production of benzol 50/90) at 4 gallons per ton of coal-tar we shall not ng, and thus we come to find that about 2,000,000 benzol were produced in Great Britain during 1885. quantity was produced from the coal-tar of gas- ing 1886, as although some 3 per cent. more was throughout the country than in 1885, yet about this as burned as fuel, leaving the quantities unaltered. ve already mentioned, the Milton works of the ire Carbonising Co. were idle during 1886, and thus equal to at least 180,000 gallons per annum was he market. Tamworth was not working at *full*; carbonisers being *completely stopped.*

What do we find is going on at the present time? We were informed some time since that the carbonising works at Miles Platting had actually started; but, on making inquiry, we found this not to be the case, and further we learned that it was extremely probable the plant would never start again *there*, part of it being dismantled, the exhausters being now fixed and working in Burnley.

The plant of the Staffordshire Carbonising Co. is being removed to the Talk-o'th'-Hill collieries, and will soon be worked on an enormous scale. Our Staffordshire correspondent writes us this morning that if necessary, the plant could be in working order by November, but that it is not intended at present to commence before the middle of December. There are one hundred through retorts being erected to start with, after which more will be put up so as to make the turn-out equal to double that produced at Milton, or 360,000 gallons during the year.

Now, what will be the effect of this enormous quantity on the market? We are told that the price does not rise now because there is too much already on the market, and yet in January we shall see no less a quantity that ONE-SIXTH more added to it. Are we not correct then in assuming a tremendous fall in values, and are we not also acting in the best interests of tar distillers and gas proprietors in calling attention to such a serious state of affairs? If we were tar distillers, we would not purchase tar for more than a month forward; and if we were gas engineers we would burn ALL our make until the crisis was over.

We have not yet related the whole of the adverse influences which will affect the benzol market. Our Paris correspondent informs us that a well-known mine owner in France has just entered into an agreement with a large aniline firm, in which the owner is to erect an enormous number of Simon-Carvès' coke ovens, the aniline firm erecting and maintaining for ten years condensing and washing plant for regaining the benzol from the gases by Caro's process. It is expected that 2 gallons of benzol will be obtained from each ton of coal carbonised. In spite of all this we look on in wonderment and ask ourselves, What next? Our own impression is that if the tar-distillers of this country do not mind their p's and q's, they will receive such a blow this winter and next spring as will oblige the gasworks to deal with the tar themselves. Benzol at one shilling per gallon f.o.b. Goole, casks included, is not pleasant news for the producer of it; but we are now much nearer that point than some tar-distillers imagine, and it may further be depended upon that the depression will be in some degree lasting.

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

(Continued from page 99.)

THE mud produced by Weldon's process in 1867 was practically a hydrated sesquioxide of manganese, that is to say a mixture of oxides, or a definite combination of them, wherein one equivalent of protoxide was present for each equivalent of peroxide—$MnO + MnO_2$, or Mn_2O_3.

Now, by the old process, a ton of 70 % manganese ore consumed practically about 11,000 lb. of liquid muriatic acid of 28° to 30° Tw., and yielded about 1,200 lb. of chlorine, while the dry oxide of manganese from Weldon's process, though not requiring any more acid to dissolve it, on the manufacturing scale yielded only 1,000 lb. of chlorine; the value of a ton of recovered manganese was therefore clearly but five-sixths of a ton of native manganese ore of 70 per cent. and therefore the cost of recovery to be of any commercial advantage was necessarily limited to a sum much lower than the cost-price of five-sixths of a ton of native ore, say 41s. per ton, or forty-one shillings for that quantity of manganese mud which would yield 1,000 lb. of pure chlorine.

That the cost approximated to this in the early days of the process is clearly manifest by the almost superhuman efforts which were made to improve the methods of working, and by the reluctance of other manufacturers, still pursuing the old process, to enter into the new scheme. These expenses,

OUR PRICE CURR[illegible]

PREPARED BY HIGGINBOTTOM AND CO., 116, POI[illegible]

The values stated are F.O.R. *at maker's works, or at usual port[illegible] localities may vary.*

	£	s.	d.
ACIDS:—			
,, Acetic, 25 °/₀ ... ... per cwt.	0	10	3
,, ,, Glacial ... ... per lb.	0	0	6½
,, Arsenic... ... ... per cwt.	0	13	0
,, Chromic ... ... per lb.	0	0	5
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	6
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	2½
,, Oxalic ... ... ,,	0	0	4½
,, Sulphuric (fuming 40 °/₀) ... ... ,,	12	0	0
,, ,, (Brimstone 168°) ... per ton	4	5	0
,, ,, (Pyrites 168°) ... ... ,,	3	10	0
,, ,, (spent oxide 168°) ... ,,	4	0	0
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	2	0	0
,, Tartaric ... ... per lb.	0	1	7
Arsenic, white powdered ... ... per ton	10	12	6
Alum... ... ... ,,	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
,, = 24° ... ... ,,	0	0	1½
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per cwt.	1	2	6
,, ,, (sal-ammoniac) ... ,,	34/- & 32/-		
,, Sulphate (grey), London ... per ton	12	7	6
,, ,, (grey), Hull ... ... ,,	12	12	6
Aniline Oil ... ... per lb.	0	0	10½
,, Salt ... ... ,,	0	0	9
Antimony... ... ... per ton	35	0	[illegible]
,, (tartar emetic) ... ... per lb.	0	1	[illegible]
Barium Chloride ... ... per ton	7	10	[illegible]
,, Carbonate (native) ... ... ,,	4	0	[illegible]
,, Sulphate (native levigated) ... ,,	3	10	[illegible]
Bleaching Powder, 35 °/₀ ... ... ,,	7	12	[illegible]
,, Liquor, 7 °/₀ ... ... ,,	2	12	[illegible]
Bisulphide of Carbon ... ... ,,	13	[illegible]	[illegible]
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	[illegible]	[illegible]	[illegible]
Magenta ... ... ,,	[illegible]	[illegible]	[illegible]
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. Goole, per unit per cwt.	[illegible]	[illegible]	[illegible]
Benzol, 90 °/₀ ,, ... per gallon	[illegible]	[illegible]	[illegible]
,, 50 °/₀ ,, ... ,,	[illegible]	[illegible]	[illegible]
Carbolic Acid (crystallised 35°) ... per lb.	[illegible]	[illegible]	[illegible]
,, (crude 60°) ... ... per gallon	[illegible]	[illegible]	[illegible]
Creosote (ordinary)... ... ... ,,	[illegible]	[illegible]	[illegible]
,, (filtered for Lucigen light) ,,	[illegible]	[illegible]	[illegible]
Crude Naphtha, 30 °/₀ @ 120° C. ,,	[illegible]	[illegible]	[illegible]
Grease Oils, 22° Tw. ... ... per ton	[illegible]	[illegible]	[illegible]
Pitch, f.o.b. Liverpool or Garston ... ,,	[illegible]	[illegible]	[illegible]
Coke-oven Oils (crude) ... ... per gallon	[illegible]	[illegible]	[illegible]
,, (distilled) ... ... ,,	[illegible]	[illegible]	[illegible]
Copper (Chili bars) ... ... per ton	[illegible]	[illegible]	[illegible]
[illegible] ... ... ,,	[illegible]	[illegible]	[illegible]
[illegible] (copper scales) ... ... ,,	[illegible]	[illegible]	[illegible]
G[illegible] ... ... per [illegible]	[illegible]	[illegible]	[illegible]
G[illegible] ... ... per [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
B[illegible]	[illegible]	[illegible]	[illegible]
[illegible] (billy)	[illegible]	[illegible]	[illegible]
[illegible] (blue)	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible] (slag)	[illegible]	[illegible]	[illegible]
L[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Charles Tennant and Co. Afte[illegible]
Weldon process was found to [illegible]
[illegible]p, to which they hav[illegible]
[illegible] a ton of bleach[illegible]
[illegible]y the Dunlop [illegible]
[illegible]d value [illegible]
[illegible]of [illegible]

Lime, ..
,,
Magne[illegible]
,
Man[illegible]
Met[illegible]
Na[illegible]
O[illegible]

[illegible]ing
[illegible] I
[illegible] he [illegible]
[illegible]s of the [illegible]
[illegible] a scientific
[illegible]arters in Man[illegible]
[illegible]pass by without [illegible]
[illegible], in order to coll[illegible]
[illegible] wonderful colle[illegible]
[illegible]that moment surrounde[illegible]
[illegible] the Exhibition was to c[illegible]
Her Majesty. It was un[illegible]
[illegible]ng and appropriate mann[illegible]
[illegible]hat attractive and instructive [illegible]
[illegible] we had made as a nation in a[illegible]
[illegible]period. In nothing was that [illegible]
[illegible] than in what was called "[illegible]
[illegible] district could the distinctively a[illegible]
[illegible]e practical be better appreciated [illegible]
[illegible]ester it might truly be said to be t[illegible]
[illegible]ight place. While making their inspe[illegible]
[illegible] the thought which was most forcibly im[illegible]
[illegible]ind was, "What an amount of brain po[illegible]
[illegible]sed behind all that was to be seen." He [illegible]
[illegible]get, much less to disparage, the dexterity a[illegible]
[illegible]rkmen's fingers, on all sides manifest and won[illegible]
[illegible] past belief. But while giving every credit [illegible]
[illegible], the thought was still borne in upon him, [illegible]
[illegible]nt the thinking man, the man of research, who c[illegible]
[illegible] germs and atoms, examining and fitting each [illegible]
[illegible]proper place, building up and completing the structu[illegible]
[illegible]brain." The intellectual knowledge represented in the [illegible]
[illegible]tion could not be described, and was altogether bey[illegible]
[illegible] grasp of the ordinary mind. That was especially tr[illegible]
[illegible] respect of the chemical section, to which the member[illegible]
[illegible] Institution had devoted so large a portion of the day, [illegible]
[illegible] which those matters and products directly related [illegible]
[illegible] allied with their own industry formed an important, i[illegible]
[illegible]ing, and valuable department.

Mr. Watson Smith subsequently gave a descriptive [illegible]
[illegible] on the chemical section of the Exhibition, with [illegible]
[illegible] reference to the products connected with the gas ir[illegible]
[illegible] He said that those wonderful discoveries, the results o[illegible]
[illegible] they saw so largely exemplified in the Exhibition, ill[illegible]
[illegible] very much the value of scientific education. He t[illegible]
[illegible] the subject of technical education had been very mu[illegible]
[illegible] represented, or rather, it had been looked at in this [illegible]
[illegible] in a very one-sided manner. A very great amount [illegible]
[illegible] had been laid upon a certain kind of technical ed[illegible]
[illegible] which meant practically the anticipation of the wor[illegible]
[illegible] and it had never gone any further than that; and with[illegible]
[illegible] to the manual operations, lads were put through a [illegible]
[illegible]emature apprenticeship, and that premature apprent[illegible]
[illegible] away the time which ought to be spent in [illegible]

...e that a large number of trades were ...cially handicrafts—in the work- ...ys been well learned in ...stem. Certain facil- ...handicraft tech- ...h adjuncts ...paved ...al

...ent ...of the ...and the ...different ...to be the ...ddle classes ...had referred, ...at printing ...deficient in a ...were learning ...gave technical ...and colours was ...ployed the laws of ...did not understand. ...to learn in it both ...in addition, the actual ...kshop or the workshop ...dyeing schools. There ...colleges for the middle ...found that the parents who ...and who were interested in ...was only one item of the ...ering to—"We cannot afford ...two or two and a half years at ...we want them to keep as much ...school, because that branch is ...that was a very great temptation for ...was that the father, not knowing ...was required in modern science, ...the youth to learn science sufficient to ...he got into the dyeing school. The ...the lad stayed a year or a year and a ...learned nothing of the chemistry of ...higher class of technology—the technology ...printing, and the making of colours—was ...the college, proper time must be allowed for ...ence. Modern organic chemistry could not ...than three or three and a half years, and ...four or five years. Considering the immense ...by modern science, people must give sufficient ...requirement. When the solid study of theoretical ...sacrificed he predicted great dissatisfaction in the ...the part of those studying in colleges and schools ...given way to such errors of judgment. He knew ...amply proved the ill effects of sacrificing the theo- ...during student life for mere technique, that technique ...only half learned. At Owens College they did not ...dyeing school or a calico-printing place. They had ...money to establish either of these; but if they had the ...they had not the inclination for it, unless the students ...give three or four years of study to the science belong- ...these departments. But there was a kind of applied ...which it was possible to lecture upon and to illustrate ...dels and drawings and by visits to works, and that ...they did follow out. The difficulty was that in this ...we had only got as far as the workmen stage, and ...e nothing with regard to the other stage. We had ...e any approach to the education that was given in ...f the German and Swiss polytechnic schools; that ...ay, we had not reached the degree of *perfection* that ...attained there.

WATER-GAS.

II.

In the gas made by the Strong process the difficulty has always been its property of easily depositing soot, whilst under the influence of severe cold a portion of those substances which produce the illuminating power are liable to be precipitated or condensed.

In Lowe's apparatus the process of operation is as follows:—The generator is furnished with a grid; it is filled with anthracite, and a current of air is made to enter below the grid. During this operation generator gas is produced, and is burnt at the upper end of the generator by means of a blast of air introduced at that spot. These burning gases pass forward into the regenerator during the whole time of the blast, which takes from ten to fifteen minutes; a time varying with the strength of the blast and the cubic capacity of the fuel space, then the blast is taken off, the chimney flap closed, and steam blown in underneath the grid, while at the same time petroleum refuse is injected between the generator and the regenerator, the steam passing through the glowing layer of coal becomes decomposed into water-gas, which, together with the petroleum vapour, passes through the highly-heated regenerator, where the mixture becomes fixed and produces illuminating gas. This fixing consists in the splitting up the petroleum hydrocarbons and forming from them other forms which are not so easily condensed; and again, the undecomposed steam becomes transformed by the high temperature of the regenerator into carbonic oxide and hydrogen. It follows from this, therefore, that the injection of steam can be continued for a very long time, inasmuch as the carbonic acid which constantly arises as the cooling down of the fuel takes place becomes again reduced in the regenerator, and consequently no longer exists in the final product.

This blast of steam beneath the bars has also the result in keeping down the heat of the fuel immediately above the grid, and causes the clinkers which are formed to crumble to pieces, a point to which reference must be made later on. The illuminating gas issuing from the regenerator is now passed through the tubular condenser cooled with water, in which the vapours of easily condensible hydrocarbons are deposited; while, finally, it passes through the scrubber filled with scrap iron, which thoroughly cools down the gases and frees them from dust.

As regards the power of production, the apparatus constructed on all three systems are about equal; as, according to the results given by Andreä in Vienna, 1 kilo of anthracite and 1 kilo of petroleum oil refuse produce one cubic metre of illuminating gas, which is said to possess double the illuminating power of ordinary coal-gas.

If we now examine the apparatus that is at work in Germany, we shall find that they naturally rest on the same principles as the American, they being only distinguished by modifications in detail, necessitated by the nature of the fuel, and by the mode of utilisation of the water-gas so produced.

In America anthracite is used, it being found in that continent in a very pure state. It is used in lumps the size of an egg, and it produces practically no dust at all and very little clinker. As a result of this, the regenerators remain in a good state of preservation for a considerable time, their greatest enemy being, as is well known, the dust from the flying ashes; while the quantity of slag or clinker is so small that it can be removed with the greatest ease. In Germany, steam cannot be blown in for such a length of time as is practiced in America. In the first place, carbonic acid, in any great amount, cannot be tolerated, as, though this again becomes decomposed in the regenerator in America by means of the petroleum refuse, these conditions do not obtain in Germany; and the carbonic acid, if present, would have to be removed by the expensive process of purification—with lime.

The fuel used in Germany is mostly small coke or "breeze," in which ashes are contained of amounts varying between 10 °/₀ and 30 °/₀, so that the construction of the generator must be such as to get rid of the large masses of

certainly much greater than those experienced at the present day, were mainly owing to bad settling mud and a high proportion of base, both of which caused not only a loss of acid during the working, but greatly reduced the working capacity of the plant, inasmuch as for the same quantity of manganese requiring to be treated, a much greater volume of liquor was put through the plant than is the case to-day.

After the patent of 1868, wherein the use of an excess of lime was described, things went on more smoothly, the various details of the process were better understood, and the manufacturing axiom fully demonstrated that in any operation it is always more necessary to look after the impurities than to bother with frequent examinations of the main product. If the impurities are well considered, the main product will as a rule take care of itself. This should be the leading feature of all chemical operations when carried out on an industrial scale. The impurities may be likened unto those independent factions warring against a successful invader, keeping up a kind of guerilla warfare upon his main army, units, which independently appear of small moment, but when concentrated, dangerous.

It was by properly considering these things that the recovery process was finally made a success. The chloride of manganese liquor as it came from the still was first neutralised with lime, which, of course, without it was done very carefully caused a loss of manganese; then came the substitution of limestone dust for lime, by which the loss of manganese was obviated, and a very pure solution of chloride of manganese and calcium furnished to the oxidiser. But in some works, especially those in which a lime containing magnesia was used a new difficulty arose; the chloride of magnesium was not decomposed in the neutralising operation by limestone though it was by the lime, and this magnesia continually being precipitated in the oxidiser led to the formation of a very high base. When this was recognised, which however took much longer to discover than it takes to write it, the process, or manipulation of it was so arranged as to avoid an accumulation of magnesia in the mud, and the result was that in the years 1870 to 1875, the average base present in the mud from most works working the process amounted to about ·75 to ·82 equivalents for each equivalent of peroxide.

In our next article, we shall endeavour to describe the manganese recovery process as it is carried on at the present day, in all its details; but before closing this present, we would like to inquire what has become of the Valentin process, which, by the addition of an extremely minute quantity of the ferrocyanide of an alkali or alkaline earth to the contents of the oxidiser during the injection of air, was to cause the oxidation of 99 per cent. of the manganese to $Mn\,O_2$. In these days, when the production of the unit of chlorine from the smallest possible quantity of salt is of the utmost importance, such a process as the one just mentioned is worthy of attention by all bleaching powder makers, and it should be an easy question to inquire into, as chlorine manufacturers must by this time have formed a pretty accurate opinion of what the value of manganese mud would be with the "base" eliminated.

Since the introduction of th[illegible]eldon process the prices of all raw materials have fal[illegible] wages in a lesser degree only, and therefore the a[illegible] which were so apparent in 1872 cannot be said [illegible]ent now. In fact, we have it on very good a[illegible] one firm at [illegible]aking bleaching liquor is sti[illegible]en ton[illegible] way, making this article b[illegible] 70 per cent. native m[illegible] are [illegible]ing a profit even now.

Further, we h[illegible] the Dunlop process, [illegible]nese is decomposed b[illegible] of manganese [illegible] heating in a c[illegible] it [illegible] been by nea[illegible] this count[illegible]

After th[illegible] was erect[illegible] Rolling

the works of Messrs. Charles Tennant and Co. After [illegible]ing for a few years, the Weldon process was found to [illegible] economical than the old Dunlop, to which they have reverted. It has been found that a ton of bleach [illegible] produced from much less common salt by the Dunlop p[illegible] than by the Weldon process, and the lessened value o[illegible] in later years makes a minimum decomposition of co[illegible] salt a great desideratum.

(To be continued.)

MANCHESTER DISTRICT INSTITUTION OF ENGINEERS.

THE seventy-first quarterly meeting of this Instituti[illegible] held on Saturday, the 27th ult., at the Royal Jubillee [illegible]tion, Old Trafford. The members assembled un[illegible] central dome of the Exhibition at eleven o'clock, a[illegible]ceeded, under the guidance of Mr. Watson Smith, of [illegible] University, and vice-president of the chemical section [illegible] Exhibition, to inspect the various chemical exhibits, [illegible] special note of all the tar products, including sacchar[illegible] the most recent discoveries. After luncheon the ins[illegible] was resumed, and subsequently there was a meeting [illegible] Prince's reception room, where the President, Mr. T. [illegible] (Macclesfield), delivered a brief address. He said he c[illegible] agreed with the committee and those members of the A[illegible]tion who expressed a strong opinion that a scientific [illegible]tion such as theirs, having its head-quarters in Man[illegible] should not allow the opportunity to pass by without [illegible] one of its meetings at the Exhibition, in order to coll[illegible] and officially inspect the unique and wonderful colle[illegible] objects by which they were at that moment surrounde[illegible] of the principal purposes of the Exhibition was to c[illegible] the jubilee of the reign of Her Majesty. It was un[illegible] admitted that no more fitting and appropriate mann[illegible] have been devised than that attractive and instructive [illegible] of showing the progress we had made as a nation in [illegible] sciences during that period. In nothing was that [illegible] more distinctly seen than in what was called "[illegible] science," and in no district could the distinctively [illegible] combined with the practical be better appreciated [illegible] this. In Manchester it might truly be said to be t[illegible] thing in the right place. While making their insp[illegible] the Exhibition the thought which was most forcibly i[illegible] upon his mind was, "What an amount of brain po[illegible] been exercised behind all that was to be seen." He [illegible] wish to forget, much less to disparage, the dexterity [illegible] of the workmen's fingers, on all sides manifest and won[illegible] almost past belief. But while giving every credit [illegible] artisan, the thought was still borne in upon him, [illegible] about the thinking man, the man of research, who [illegible] the germs and atoms, examining and fitting each [illegible] proper place, building up and completing the structu[illegible] brain." The intellectual knowledge represented in th[illegible]tion could not be described, and was altogether be[illegible] grasp of the ordinary mind. That was especially t[illegible] respect of the chemical section, to which the membe[illegible] Institution had devoted so large a portion of the da[illegible] which those matters and products directly relate[illegible] allied with their own industry formed an important, [illegible]ing, and valuable department.

Mr. Watson Smith subsequently gave a descriptiv[illegible] on the chemical section of the Exhibition, wit[illegible] reference to the products connected with the gas [illegible] He said that those wonderful discoveries, the results [illegible] they saw so largely exemplified in the Exhibition, [illegible] very much the value of scientific education. He [illegible] subject of technical education had been very [illegible]sented, or rather, it had been looked at in th[illegible] very one-sided manner. A very great amou[illegible] been laid upon a certain kind of technica[illegible] meant practically the anticipation of the [illegible] had never gone any further than that; an[illegible] manual operations, lads were put thro[illegible] the apprenticeship, and that premature [illegible] the time which ought to be sp[illegible]

work. He was quite sure that a large number of trades were very much better learned—especially handicrafts—in the workshop, and he believed they had always been well learned in that way by the ordinary apprenticeship system. Certain facilities might be afforded, and a certain amount of handicraft technical education might be very useful, especially such adjuncts as drawing, sketching, planning, and modelling. That paved the way for the youth in more rapidly making himself useful and earning wages in the workshop; but there were other people to be considered besides the poorer classes. It seemed to him that by means of our Board schools, our technical shops, our dyeing schools, etc., we were training young men of the poorer classes in such a way that if we did not see to it, and the middle classes did not keep their sons up to the mark, we should be effecting a kind of revolution. The only way to avoid that was to see that collateral efficient higher class technical education was given to the sons of the middle classes. Those who had to be the managers and the leaders and the brains of large concerns required a different kind of technical education from those who were to be the workmen and the foremen. The sons of the middle classes had copied the kinds of technology to which he had referred, and we found them in small dyehouses, and at printing machines, etc., when they were lamentably deficient in a knowledge of organic chemistry. In short, they were learning to apply dyes and colours to which they gave technical names, but the chemistry of those dyes and colours was beyond them. They made use of and employed the laws of physics unconsciously; those laws they did not understand. The time of studenthood was too short to learn in it both theoretical and applied science, and, in addition, the actual manipulation and technique of the workshop or the workshop laboratory. He had mentioned dyeing schools. There were associated with some of our colleges for the middle classes dyeing schools, but it was found that the parents who brought their sons to the college and who were interested in dyeing, said—though dyeing was only one item of the technical education he was referring to—"We cannot afford to keep our lads longer than two or two and a half years at these studies, but in that time we want them to keep as much as possible in the dyeing school, because that branch is ours—we are dyers." That was a very great temptation for the parent, and the blunder was that the father, not knowing the amount of study that was required in modern science, did not allow time for the youth to learn science sufficient to make it available when he got into the dyeing school. The consequence was that the lad stayed a year or a year and a half in the college and learned nothing of the chemistry of science. If the higher class of technology—the technology of dyeing, calico printing, and the making of colours—was to be learned in the college, proper time must be allowed for learning that science. Modern organic chemistry could not be acquired in less than three or three and a half years, and in many cases four or five years. Considering the immense field covered by modern science, people must give sufficient time for its acquirement. When the solid study of theoretical science was sacrificed he predicted great dissatisfaction in the future on the part of those studying in colleges and schools who had given way to such errors of judgment. He knew and had amply proved the ill effects of sacrificing the theoretical during student life for mere technique, that technique itself being only half learned. At Owens College they did not possess a dyeing school or a calico-printing place. They had not the money to establish either of these; but if they had the money they had not the inclination for it, unless the students would give three or four years of study to the science belonging to these departments. But there was a kind of applied science which it was possible to lecture upon and to illustrate by models and drawings and by visits to works, and that course they did follow out. The difficulty was that in this country we had only got as far as the workmen stage, and had done nothing with regard to the other stage. We had not made any approach to the education that was given in some of the German and Swiss polytechnic schools; that was to say, we had not reached the degree of perfection that had been attained there.

WATER-GAS.

II.

In the gas made by the Strong process the difficulty has always been its property of easily depositing soot, whilst under the influence of severe cold a portion of those substances which produce the illuminating power are liable to be precipitated or condensed.

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As regards the power of production, the apparatus constructed on all three systems are about equal; as, according to the results given by Andreä in Vienna, 1 kilo of anthracite and 1 kilo of petroleum oil refuse produce one cubic metre of illuminating gas, which is said to possess double the illuminating power of ordinary coal-gas.

If we now examine the apparatus that is at work in Germany, we shall find that they naturally rest on the same principles as the American, they being only distinguished by modifications in detail, necessitated by the nature of the fuel, and by the mode of utilisation of the water-gas so produced.

In America anthracite is used, it being found in that continent in a very pure state. It is used in lumps the size of an egg, and it produces practically no dust at all and very little clinker. As a result of this, the regenerators remain in a good state of preservation for a considerable time, their greatest enemy being, as is well known, the dust from the flying ashes; while the quantity of slag or clinker is so small that it can be removed with the greatest ease. In Germany, steam cannot be blown in for such a length of time as is practiced in America. In the first place, carbonic acid, in any great amount, cannot be tolerated, as, though this again becomes decomposed in the regenerator in America by means of the petroleum refuse, these conditions do not obtain in Germany; and the carbonic acid, if present, would have to be removed by the expensive process of purification—with lime.

The fuel used in Germany is mostly small coke or "breeze," in which ashes are contained of amounts varying between 10 °/₀ and 30 °/₀, so that the construction of the generator must be such as to get rid of the large masses of

clinker which arise from the fuel; and also the regenerator lining must be made of the best fire material in order that it shall be durable. The problem has been solved by means of water-ring inserted on the lower end of the generator, as this renders the use of a grid superfluous, and at the same time protects that part of the generator which is mostly exposed to the heat and corrosive melted slag or clinker. The slag forms a mantle on the conical sloping surface of the fuel, which reaches into the ring-shaped opening of the water-rings, and is removed from there without any difficulty, through four doors, each fitted with a Morton lid. The clinkering takes place every six hours, and requires from a quarter to half an hour to complete, the time, of course, varying with the quantity of clinker that is to be removed.

At first sight it would appear as if this cooling-ring would give rise to a great loss of heat, but after careful consideration and experience in practice, this is found not to be the case. During the warm blast the cold air strikes the underside of the ring and cools the same; that is to say, it removes the heat which has radiated from the fuel towards this underside. This amount of heat is only of any importance immediately after cleaning out, by which the slag mantle covering the fuel is removed. The slag mantle which again becomes formed after a short lapse of time at once prevents any great radiation of heat. This quantity of heat is, however, lost under any circumstances, inasmuch as it must be removed before the gas enters the gasholder, and it is therefore immaterial whether this takes place partially in the cooling-ring or exclusively in the scrubber.

(To be continued.)

Correspondence.

GERMAN CHEMISTS.

To the Editor of the Chemical Trade Journal.

Sir,—In importing the above new title into the controversy, "A German Chemist" makes one or two remarks upon which I desire to say a few words.

I am the best judge as to whether the German chemists have done *me* "even a little bit of harm." I happen to know an instance or two where they have done so. In one case I applied for a situation, asking £200 a year; a German Ph.D. obtained it by asking £75 a year, which was not to commence until he had been in the position six months. He lost the situation in less than twelve months, and an English chemist took the position at £150. Did this German chemist do English chemist no injury? Did he not do me even a little bit of harm?

An ounce of fact is worth a pound of theory, and "A German Chemist" should beware and be careful what he says "off-hand."

I suppose it is not possible to procure the average salaries of both English and German chemists; but I had an opportunity in 1883 of seeing the replies to an advertisement for a works chemist; I have an abstract before me. I find five Germans, of whom three were Ph.D.'s, their ages varying from twenty-three to twenty-nine years; handwriting faulty, testimonials in one case good, in two fair, two none at all, one asked for offers, another said he did not require remuneration, two asked for £1 per week, and one asked £65 per annum.

Of the Englishmen who applied, one was a youth who asked 10s. to 15s. per week, handwriting bad; another asked £52 to 65 per annum, age eighteen, one reference and no testimonial. The ages of the thirteen others varied from twenty-five to forty-one years; handwriting generally good, five sent good testimonials, eight none at all, one asked £120 to rise, another £230 or offers, another £240 or meet views, one asked £300 to start, two asked a clear £4 a week, another asked £300 a year, another £400 or might come to an arrangement, two wanted offers, and three asked for £150 year.

In the absence of the "average salaries of both and German chemists who are at present workin country," I presume the salaries which English and chemists ask when applying for situations is the criterion. I have given this, and when "A German C says the German is drawing the largest salary, I sim the tongue of incredulity into the cheek of derision a it's "all my eye and Betty Martin."

His second paragraph does infinite credit to his *belief*. I am quite prepared to admit that a few applicants for positions as works chemists are not trained, being merely laboratory "bottle-washers" picked up little points of routine testing, and supple by "some evening instruction of a year's duratio when "A German Chemist" says "*every German has been trained as a chemist, which is more than mos chemists can say*," I become too indignant to do m cast his statement in his teeth, and wait to see if hi English chemists as a body will provoke them a from a long-suffering set of men a protest and a cond which will convince him that they will not let chemists add insult to injury.

Yes, I think, with "A German Chemist," th style of solid professor has died out in England— *extent*;—but although some of our most prominent are better fitted for the hustings than the laborator still well supplied with men who are content to noise, to forego the *manufacture* of their own fame, on quietly doing good solid work. I must not say would be invidious to name the living chemists. however, looked well through the *Journal of the Chemical Industry* and the *Chemical News* for e that superiority of German over English chemists, a I may with equal justice say that the shades o Wohler, and the older German *solid* chemists "very mournfully" on the young aspirants to th so many of whose "researches!" and memoirs are of in two-line notices or "do not admit of useful abs In conclusion, let me tell "A German Chemi German chemists *do* perform routine work every d English chemists do, and I have no doubt other will be forthcoming to support my statement as their *talents* too highly, etc. The price they ask talents shows this is not so; besides, routine work done, whatever else is done besides, and if the Ge not do it the employer would soon say, as Cro "Get ye gone and give place to better men." I ca him that English chemists also look out for thos employ their talents to better advantage. It peculiarly German virtue this; I have been doing ten years.

One word more. Can you tell me, Mr. Editor, German chemists who do not require remuner supported? We have bounty-paid foreign sugar such a thing as a bounty-aided German chemist? this cutting from the *Sheffield Telegraph* the other d

> GERMAN Youth, of good family and education, SITUATION in good Sheffield House; remunera required.—H. M., Box 3, *Telegraph* Office.

How do they do it? As "A German Chemist" answered my other letters, will he oblige your explaining.—I am, etc.,

MEN

THE SCIENTIFIC BALLOON ASCENT.—On Sat 13th ult., two French aeronauts, M. Mallet an Jovis, made an ascent to ascertain the extreme which man can penetrate and sustain life. Two containing 600 litres of oxygen, were suspended fr of the balloon "Horla." The aeronauts reached of over 7,000 metres. They started at 7-15 a.m La Villette Gasworks, and descended at 11 a.m. in Belgian Luxemburg, being obliged to descend of ballast. M. Mallet was twice seized with a fa At 3,800 metres the balloon and instruments we with hoar-frost. The effects of inhaling the oxyge as yet been described.

SPECIAL NOTICE.

The favour already accorded to **The Chemical Trade Journal** is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, **the Organ** of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

DAVIS & CO.,

CHEMICAL TRADE JOURNAL OFFICE,

42, JOHN DALTON STREET, MANCHESTER.

Also that communications relating to the Editorial or Business Departments of the Journal be endorsed "EDITOR" or "MANAGER," as the case may be.

As an **advertising medium** *The Chemical Trade Journal* occupies quite a unique position, it being the **only weekly Journal** exclusively devoted to the commercial aspect of chemistry and cognate industries. The Journal circulates amongst

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It will thus be seen that *The Chemical Trade Journal* offers unusual facilities for bringing trade announcements under the notice of a large and important class of buyers, and when it is added that the tariff for advertisements is not an expensive one, the advantages of this department of the Journal will be apparent to all those who seek to extend their business by that indispensable aid to nineteenth century enterprise and success, viz., **judicious advertising.**

Notes and Queries.

How to Pack Nitric Acid.—The Council of Hygiene of the Department of the Seine have adopted M. Schutzenberger's conclusions in regard to the packing of nitric acid. It is recommended that the carboys be packed with either straw, hay, or, still better, varech, previously soaked with a cold saturated solution of soda or zinc sulphate, and dried in the open air. The wooden boxes enclosing the whole are to be similarly impregnated, and the carboys are never to be filled completely.

Notes for Manure Makers.—The summary of the agricultural returns of Great Britain for 1887 were issued by the Agricultural Department of the Privy Council on Wednesday, the 17th ult. The returns were collected on June 4th. The acreage of land under wheat is stated at 2,317,362 acres, an increase as compared with 1886 of 31,457 acres, or 1·4 per cent.; that under barley is 2,085,204 acres, a decrease of 155,960 acres, or 7 per cent.; that under oats 3,087,989 acres, an increase of 6,393, or 0·2 per cent.; that under potatoes 559,648 acres, an increase of 5,687, or 1 per cent; and under hops 63,506, a decrease of 6,621 acres, or 9·4 per cent. Compared with 1885, wheat shows a decrease of 160,956 acres, or 6·5 per cent.; barley, a decrease of 172,142 acres, or 7·6 per cent.; oats, an increase of 147,499 acres, or 5 per cent.; potatoes, an increase of 10,917 acres, or 2 per cent.; and hops, a decrease of 7,821 acres, or 11 per cent.

Technical Schools.—It is stated that over £10,000 has now been received in aid of the scheme for establishing a technical school for Stockport, and that building operations will shortly be commenced. A Jubilee technical school has also been proposed for Blackburn, and over £8,000 has been received by the Borough Treasurer on this account. So enthusiastic have the inhabitants been that even the borough police force, from the chief constable downwards, have given a day's pay to the fund. The Bradford Chamber of Commerce have presented a petition to Parliament expressive of their great satisfaction that the Bill for technical instruction has received a second reading, and suggesting that in Committee certain amendments be introduced to facilitate its practical working.

The Coal Trade.—At length the severe competition maintained between the sellers of Dean Forest and Welsh coals in the West of England has had its effect. The Forest masters find it impossibe to go on any longer under the present conditions, and on Saturday invited the men's representatives to see the list of actual prices, with the result that a reduction of 2½ per cent. will take immediate effect.

Fire at Radcliffe.—A fire, supposed to be due to the overheating of a stove, occurred a few mornings ago at Messrs. Hardman Brothers' Dyeworks, Radcliffe, and damage to the amount of £700 was caused.

Scottish Oil Works.—At a meeting of the Scottish Mineral Oil Association, held in the Chamber of Commerce on the 26th ult., a former resolution, that no company should arrange with its men without consulting the association, was rescinded, and it was unanimously resolved to open the works of the several companies on Thursday, 1st September, to such miners and other workmen as may be willing to return to their employment at the reduced rates of wages intimated in June last. Notices to this effect will at once be posted at the various works, pits, or mines.

Advertising.—We suppose that all newspapers are pestered with modest applications for "a puff"—to such of our correspondents afflicted with this disease we ask the perusal of the following paragraph which has been going the round of other newspapers:—Jones: Ha! old fellow, how are you? Just heard that you'd gone into the newspaper business.—Smith: Yes; just bought a county newspaper.—Jones: That so? Why, you can give me an occasional puff now? I am in the clothing business—ready made clothing.—Smith: Ha! then you can give me an occasional suit of clothes.—Jones: Well, dunno about that. It costs money to manufacture clothing, you know.—Smith: That's true, and it costs nothing to manufacture newspapers, I suppose!

A Soap Factory in Java.—An extensive soap factory has recently been established at Samarang, in Java, where [illegible] for the purpose. It is well known that there is a large market in this country for soap making, so that there is a great probability of the English trade in this article being [illegible].

Death of Mr. Henry Hall, J.P., St. Helens.—On Thursday morning, the 18th ult., Mr. Henry Samuel Hall, J.P., of Windle Grange, St. Helens, died after a somewhat protracted illness. The following brief biographical sketch may be interesting: Henry Samuel Hall, born 1822, was the son of the Rev. Samuel Hall, J.P., vicar of Billinge. His early education was carefully conducted under the personal superintendence of his father, and when he reached the years of budding manhood he obtained an appointment in an eminent London bank. At the age of 33 he married Miss Cross, daughter of the late John Cross, Esq., of Windle Grange, and for five years resided in London. Shortly after the death of Mr. Cross they returned to St. Helens, and have continued to reside at Windle Grange. Subsequently Mr. Hall and his brother commenced a chemical manufactory at Widnes, trading as Hall Brothers, later on being joined by Mr. Shaw (Hall Bros. and Shaw), under which title the works are continued.

Chemicals in Germany.—In reporting on the trade of last year in the district of Frankfort on the Main, Consul-General Oppenheimer states that an improvement was noticeable in chemicals—potash, prussiate of potash, borax, blue vitriol, spirits of salammoniac, and other articles obtaining higher prices. Of British chemicals, a falling off in the import into Germany took place in caustic soda (1,645 tons against 2,621 tons in 1885); in calcined soda (1,078 tons against 1,566); in soda and soda crystals (894 tons against 5,538); in chloride of lime (508 tons against 5,096); and in saltpetre (1,692 tons against 4,669). Greater quantities, however, were imported of sulphate of ammonia (28,269 tons against 25,169 tons in 1885); of chromate of potash (853 tons against 571); and of dyeing wood (2,678 tons against 2,067). The import of bone manure from Great Britain had risen from 2,054 tons to 2,228 tons.

Wigan Coal and Iron Company Limited.—The report of the directors of this company for the half-year ended 30th June last, was issued to the shareholders recently. It states that the output and sales of fuel had been less than in the preceding half year. The coal trade of the district had remained in a very depressed condition, and prices had been lower. No change had been made in the wages paid to colliers. The furnaces in operation at the ironworks had worked well, and the trade in iron had been rather better. The accounts show a profit of £15,585. 10s. 5d. on the whole operations of the company for the half year. From this had to be deducted the adverse balance of £6,510. 14s. 10d. brought forward from last year, leaving £9,075. 1s. 7d. available for division. The directors recommend a dividend after the rate of 1 per cent. per annum, free of income tax, which will absorb £9,048. 12s. 6d., leaving £26. 9s. 1d. to be carried forward. The paid up capital amounts to £1,809,728, and the mortgage or debenture debt, £98,700. The property of the company consists of freehold land, £[illegible] 9s. 6d.; stock in trade, £223,107; and collieries, coke ovens, steamships, etc., £1,228,280. 8s. 3d. The suspense accounts show a still further increase, these being at the end of the half year as follow: Standish tunnelling suspense account, £20,658. 18s. 5d., and mine rent suspense account, £[illegible] 9s. 4d. The auditors state that there had been deducted the sum of £27,601. 18s. 3d. for depreciation, and the additions to plant had amounted to £8,440. 10s. 8d.

An Enormous Fire.—A stack of coal, containing between 14,000 and 16,000 tons, is on fire at Messrs. Knowles's pits, Little Lever, near Bolton. Thirty men were engaged on Thursday, the 25th ult., in clearing a portion of the stack, but they had not been able to reach the burning mass, on which water is being poured. Much destruction has already [illegible] and the damage, which will be considerable, is [illegible] by insurance. Spontaneous combustion is [illegible] cause of the outbreak.

Exhibition of Brewing Materials.—An important exhibition of brewing materials, apparatus, and processes is to be held in the Palais de l'Industrie at Paris, under the patronage of the minister of agriculture. This exhibition will be the most complete of its kind ever held. It will open on August 27th and close October 31st.

Electric Tramways in America.—The United States, we know, are in the van with regard to electric lighting. But it is not so generally known to what an extent electricity is at present being used there for supplying motive power. According to an estimate made by the *Electrical Review* (New York), more than 3,500,000 passengers are carried annually in America in tramcars propelled by electric motors. In Montgomery, Alabama, electricity is used on eleven miles of road, and the cost is reported to be only one-half the cost of horse-power. Roads on which electricity takes the place of horses are found in Baltimore, Los Angeles, Port Huron, Detroit, Scranton, Appleton (Wisconsin), and Denvir. Electric tramways are either in course of construction or under contract in twelve other cities, and in thirty-seven towns companies have been formed or other steps taken for the construction of such roads. Upon none of the lines now in operation in the United States, however, is force supplied by storage batteries attached to the cars. In most cases, power is communicated by an overhead conductor.

Accident at a Chemical Works.—On the 11th ult. an explosion occurred at the works of Messrs. George Jarmain and Son, Turnbridge, Huddersfield, and one of the workpeople, James Hiley, was dreadfully injured. From some unexplained cause a hydro-extractor burst, and Hiley was struck by the pieces, and one arm and one leg were almost severed from the body.

J. C. and J. Field Limited.—Capital, £200,000, in shares of £10 each. Object, to acquire the business hitherto carried on under the style of J. C. and J. Field, in wax bleaching, stearine making, ozokerit refining, and making of candles, soaps, sealing-wax, and other articles, carried on at Upper Marsh, Lambeth, at Wellington Road, Battersea, at Bermondsey New Road, and at West Molesey, together with the premises, stock-in-trade, and other assets thereof. The price to be paid by the Company for the property, which includes the freehold land and buildings, is fixed at £199,341. 16s. 2d., of which £53,300 is to be paid in ordinary and preference shares, and the balance in cash. The present issue of shares has all been subscribed for. The first managing directors are to be Edward John Stephens and Charles Leopold Field, at a remuneration of £750 per annum. The remuneration of the directors (other than the managing directors) to be the sum of £700.

Steel Works' Waste Becoming Profitable.—Our Wolverhampton correspondent writes:—The Thomas Gilchrist process of steelmaking is daily proving an increased source of wealth to the English ironmaking districts whose ores are of a phosphoric nature. The employment of the waste slag produced from the basic converters in the course of manufacture in agricultural fertilising is proving very successful. Those chemical elements, which, if present in excess, are productive of much loss to the steel master, are invaluable to the farming community. The Staffordshire Steel and Ingot Iron Company, at their works at Bilston, are experiencing such a good demand for the basic manure that they have made arrangements for doubling their present grinding plant. The Company are now manufacturing 100 tons of the finest ground steel manure per week, and if their capacity were sufficient they might have orders in hand for 2,000 tons ahead.

Petroleum Wells in Egypt.—A telegram was received from Cairo from the engineer in charge of the petroleum works at Djemsch, stating that on Friday night the 26th ult. the boring had reached a depth of 1,310 feet, when there was a violent rush of gas, which, becoming ignited from a lamp caused an explosion, whereupon about 80 feet of petroleum entered the boring. The telegram adds that the operation of drilling was resumed on Saturday, and that, as the oil was still coming in, there is every indication of a good well being obtained shortly.

:N SUGAR BOUNTIES.—The committee of French nufacturers have adopted a resolution which demands French Government do not accept the invitation to ention on the abolition of bounties. They will o the President of the Council a protest against osed convention, in which it is said the abolition nties would bring on the ruin of the French refiners.

:TRIKE IN THE OIL WORKS.—At the instance of burn Oil Company, decrees of ejectment have been in Linlithgow Sheriff Court against about ninety If at the expiry of eight days the men have not from the company's houses, the decrees will be

IER COAL STACK ON FIRE.—On the evening of the a large heap of slack coal became ignited at the works ncorn Soap and Alkali Company. The fire spread to ing shed, which was partially destroyed. The amount e is not estimated. Fifteen years ago upwards of works were destroyed at a total loss of £80,000, and rm was caused among the townspeople when the f the fire became known.

NDIGO MARKET.—Indigo in Behar was somewhat owing to a seasonable break in the weather, but expectations have not been realised. The prospects he result will be equal to that of last year from the ings. The indigo of Tonquin is likely to prove a s rival to that of Bengal and Guatemala, which it in colour. The soil of Tonquin is singularly for the cultivation of indigo, and since the French session of the country the mode of production has mproved. There is also a species of wild indigo, hina green, which will soon take a place in the n markets. India will, no doubt, hold a leading in the indigo trade as long as good quality and prices enable the Indian trader to compete success- h rivals from Java and Tonquin, from Manilla and la, but it is necessary that the Indian planter and merchant should keep a good look-out and be alive s doing in other parts of the world.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

lightly improved feeling reported last week is at least ed, although with no heightening of nominal quota- cept fractionally in soda crystals and sulphate of ; the latter is likely to mount a further shilling or n although strikes in the shale trade should end an expected. Scotch production of the article has atened with serious diminution, owing to not a few (public and private) making trial of mineral oil-gas of the familar coal-gas, but results in at least one nting burgh do not show an unqualified success, and movement is not likely to be a rapid one, if it sur- ll. There is prospect of the Scotch paraffin distillers rican petroleum refiners combining to raise the price Negotiations now in progress are of some promise esired direction. The demand for manufactured generally has been mending, and a few of the ave been temporarily hampered by short stocks of erial. Bichromates, however, hardly share this ffening of tone, and are on the contrary, for the even less called for than they were a month ago. ts stand as follows :—Soda crystals, 46s. to 47s. net alum, £4. 17s. 6d., less 2½ % Glasgow; borax, Refined, £31, and boracic acid £46, net Glasgow; 1d., less 11 °/₀ Tyne; caustic soda, white, 76°, 70/72°, £7. 10s.; and cream, 60/62°, £6. 5s., less verpool; bicarbonate of soda, 5 cwt. casks, £6, t. casks, £6. 5s., net Tyne; refined alkali, 48/52°, ss 5 °/₀ Tyne; salt-cake, 24s.; bleaching powder, 6d., less 5 °/₀ Glasgow; bichromate of potash, nd of soda, 3½d., less 5 °/₀ Glasgow; nitrate 8s. 9d.; chlorate of potash, 6d., less 5 °/₀; of ammonia, £12s. 10., f.o.b. Leith; paraffin scale, 2d.; wax, semi-refined, 120°, 2d. to 2¾d.; spirit burning oil 5d. *to 5½d., combination conditions;* sulphate of copper, £13s. 15s., less 5 °/₀ Liverpool. Imports at Clyde ports for the week include 2,043 tons pyrites of copper, 9,000 barrels of rosin, 1,368 barrels paraffin scale (American), 187 tons phosphate, 224 bags asbestos, 40 tons fustic, and 1,000 casks spirits of turpentine.

THE TAR PRODUCTS MARKET.

THERE is not much change to report in the benzol market; buyers are holding off until they are able to form a better idea of the future. Several of our correspondents have severely criticised our report of last week, and therefore it has become necessary to show upon what grounds our opinions were based. We have, therefore, in our leading article of this issue devoted some space to the probable future of this market, to which we must refer our readers. Benzol is selling at 2s. 9d. for 90's, and 2s. 4d. for 50/90's; anthracene, 1s. 3d., f.o.b. London; carbolic acid has advanced slightly, and coal-tar pitch is in slightly better demand, though the value has not improved. It is our candid opinion that tar-distillers will make a mistake if they contract to take tar at present prices over all next year.

THE SULPHATE OF AMMONIA MARKET.

THE market is very dull and prices uncertain, though continental advices assure us this need not be the case. Hull sulphate is quoted at £12. 3s. 9d. to £12s. 5s., but we have not heard of any business being done at such low figures. Beckton is quoted at £12, and outside makes in London at £12. 5s. to £12. 7s. 6d. The Leith market is firm at £12. 2s. 6d. to £12. 5s., but such quotations can only be nominal. There has been a sudden drop in the price of sal-ammoniac owing to the action of the combined makers, amounting to £2 per ton. The Liverpool water is advertised, and tenders must be sent in before the 26th inst. The Salford Corporation are talking of making their own sulphate, a quantity equal to 800 or 900 tons per annum.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

11,393. O. BOWEN and J. COBELDICK. For an improved deodorising, decolourising, and filtering medium. August 20.

11,485. J. H. BARRY. For improvements in treating and purifying sewage, the same being applicable for other disinfecting purposes. August 23.

11,492. H. H. LAKE (a communication from A. Kayser, H. Williams, and A. B. Young, of United States). For improvements relating to the production of caustic alkali, carbonates of the alkaline metals, muriatic acid, and other substances. August 23.

11,493. H. H. LAKE (a communication from A. Kayser, H. Williams, and A. B. Young, of United States). For an improved method or process of producing silicate of sodium or of potassium. August 23.

11,494. H. H. LAKE (a communication from A. Kayser, H. Williams, and A. B. Young, of United States). An improved method or process of producing muriatic acid. August 23.

11,500. C. J. E. de HAËN. For improvements in the manufacture and application of the compounds of fluoride of antimony with the combinations of the chlorides of sodium, potassium and ammonium and phosphates of soda, potash and ammonia. Aug. 23.

11,534. T. M. J. TRUCHELUT and J. N. TRUCHELUT. For a new or improved process and apparatus for extracting or neutralising ammonia and sulphur compounds. August 24.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
ACIDS:—			
,, Acetic, 25 °/₀ ... ... per cwt.	0	10	3
,, ,, Glacial ... ... per lb.	0	0	6⅞
,, Arsenic... ... ... per cwt.	0	12	9
,, Chromic 70 °/₀ ... ... per lb.	0	0	4½
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	6
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	2¼
,, Oxalic ... ... ,,	0	0	4⅛
,, Sulphuric (fuming 40 °/₀) ... ... ,,	12	0	0
,, ,, (Brimstone 168°) ... per ton	4	5	0
,, ,, (Pyrites 168°) ... ... ,,	3	10	0
,, ,, (spent oxide 168°) ... ,,	4	0	0
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	2	0	0
,, Tartaric ... ... per lb.	0	1	7
Arsenic, white powdered ... ... per ton	10	12	6
Alum... ... ... ,,	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
,, = 24° ... ... ,,	0	0	1¾
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per cwt.	1	2	6
,, ,, (sal-ammoniac) ... ,,	34/- & 32/-		
,, Sulphate (grey), London ... per ton	12	5	0
,, ,, (grey), Hull ... ... ,,	12	5	0
Aniline Oil ... ... per lb.	0	0	10
,, Salt ... ... ,,	0	0	8½
Antimony... ... ... per ton	35	0	0
,, (tartar emetic) ... ... per lb.	0	1	0
Barium Chloride ... ... per ton	7	10	0
,, Carbonate (native) ... ... ,,	4	0	0
,, Sulphate (native levigated) ... ,,	3	5	0
Bleaching Powder, 35 °/₀ ... ... ,,	7	10	0
,, Liquor, 7 °/₀ ... ... ,,	2	12	6
Bisulphide of Carbon ... ... ,,	13	0	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... ,,	0	3	9
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. London, per unit per cwt	0	1	3
Benzol, 90 °/₀ ,, ... per gallon	0	2	9
,, 50 °/₀ ,, ... ,,	0	2	4
Carbolic Acid (crystallised 35°) ... per lb.	0	1	2
,, (crude 60°) ... ... per gallon	0	3	6
Creosote (ordinary)... ... ... ,,	0	0	1½
,, (filtered for Lucigen light) ,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C. ,,	0	1	3
Grease Oils, 22° Tw. ... ... per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ... ,,	0	13	6
Coke-oven Oils (crude) ... ... per gallon	0	0	1½
,, (distilled) ... ... ,,	0	0	2
Copper (Chili bars) ... ... per ton	40	5	0
,, Sulphate ... ... ,,	14	0	0
,, Oxide (copper scales) ... ... ,,	36	15	0
Glue ... ... per cwt.	1	17	6
Glycerine (crude) ... ... per ton	33	0	0
,, (refined) ... ... ,,	53	0	0
Iron (turnings)... ... ... ,,	1	13	0
,, Peroxide (blue billy) ... ... ,,	0	7	0
,, (bog ochre) ... ... ,,	1	13	0
,, (pr[illegible] ... ... ,,	3	0	0
Sulphate ([illegible] ... ... ,,	1	2	6
[illegible]ulphide [illegible]g) ... ... ,,	1	0	0
[illegible]heet) ... . ,,	13	5	0
[illegible]cets ... ... ,,	26	5	0
[illegible] .. .. ,,	19	0	0
[illegible] ... ... ,,	22	10	0
Lime, Acetate (brown) ... ... per ton	9	17	6
,, ,, (grey) ... ... ,,	13	15	0
Magnesium (ribbon and wire) ... ... per oz.	0	2	6
,, Chloride ... . per ton	2	5	0
,, Carbonate .. .. per cwt.	1	17	6
,, Hydrate ... ... ,,	0	10	0
,, Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... . ,,	19	10	0
,, Borate .. .. per cwt.	2	5	0
,, Ore, 70 °/₀ ... ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	4
Naphtha (Wood), Solvent ... ... ,,	0	4	1½
,, ,, Miscible, 60° O.P. ... ,,	0	5	6
OILS:—Castor ... ... per cwt.	1	4	6
Cotton-seed ... ... per ton	21	10	0
Linseed ... ... ,,	21	0	0
Lubricating, Scotch, 885°—890° ... ,,	5	17	6
Petroleum, Russian ... ... per gallon	0	0	5½
,, American ... ... ,,	0	0	5⅝
Silver (metal) ... ... per oz.	0	3	8¼
,, Nitrate ... ... ,,	0	2	8
STARCHES:—			
Sago ... ... per cwt.	0	8	9
Potato (farina) ... ... ,,	0	10	3
Sodium (metal) ... ... per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀ per ton	5	5	0
,, ,, (Caustic Soda-ash) 48 °/₀ ,,	4	0	0
,, ,, (Carb. Soda-ash) 48 °/₀ ,,	4	2	6
,, ,, (Soda Crystals) ... ... ,,	2	13	9
,, ,, (Crystal Carbonate) ... ,,	5	8	9
,, Chlorate ... ... per lb.	0	0	7½
,, Borate (Borax) ... ... per cwt.	1	8	6
,, Bichromate... ... ... per lb.	0	0	3⅛
,, Hydrate (74 °/₀ Caustic Soda)... per ton	8	0	0
,, ,, (70 °/₀ Caustic Soda)... ,,	7	7	6
,, ,, (60 °/₀ Caustic Soda, white) ,,	6	7	6
,, ,, (60 °/₀ Caustic Soda, cream) ,,	6	6	3
,, Bicarbonate ... ... ,,	6	0	0
,, Hyposulphite ... ... ,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool per cwt.	0	8	9
,, Silicate (glass) ... ... per ton	5	10	0
,, ,, (liquid, 100° Tw.)... ... ,,	4	7	6
,, Sulphate (Salt-cake) .. .. ,,	1	4	0
,, ,, (Glauber's Salts) ... ,,	2	2	6
,, Sulphite ... ... ,,	5	17	6
Potassium (metal) ... ... per oz.	0	3	10
,, Bichromate ... ... per lb.	0	0	4½
,, Carbonate, 90% ... ... per cwt.	0	18	9
,, Chlorate ... ... per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ... per ton	23	0	0
,, Nitrate (refined) ... ... per cwt.	1	2	0
,, Prussiate Yellow ... ... per lb.	0	0	7½
,, Sulphate, 90 °/₀ ... ... per ton	10	0	0
,, Muriate, 80 °/₀ ... ... ,,	9	0	0
Strontium Hydrate, 98 °/₀ ... ... ,,	7	15	0
Sugar, Beet ... ... per cwt.	0	12	9
,, Cane ... ... ,,	0	16	0
Sulphocyanide of Barium ... ... per lb.	0	0	6
,, Ammonium ... ... ,,	0	0	9½
Sulphur (Flowers) ... ... per ton	9	5	0
,, (Roll Brimstone) ... ... ,,	6	0	0
Superphosphate of Lime (28 °/₀) ... ... ,,	2	0	0
Tallow ... ... ,,	22	10	0
Tin (metal) ... ... ,,	103	0	0
,, Crystals ... ... per lb.	0	0	6⅞
Zinc (Spelter) ... ... per ton	14	15	0
,, Chloride (solution 96° Tw.) ... ... ,,	5	15	0

URDAY, SEPTEMBER 10, 1887.

PRESENT POSITION OF THE ALKALI MANUFACTURE.

this head and in another column may be found portion of a paper read by Mr. A. E. Fletcher, the spector under the Alkali, etc. Works Regulation sponse to an invitation from the Chemical Section itish Association. In this paper, when speaking of anc process, the essayist uttered the following "During the whole century which has followed the cation of Leblanc's process, it has successfully with- attacks of all rivals, and although now its supremacy ercely attacked than at any previous period, I think e able to show that its foundations are still secure, t will maintain its position for many years to come." d exhortation "Never to prophesy without you ay be well applied to this case, for there never was hen the Leblanc process stood in such pitiable t does to-day. With salt-cake selling at 22s. per works in which it is produced; soda-ash at £4 per m caustic at six guineas; and the only paying aching powder, kept at a paying price by artificial ich are of themselves directly opposed to the tenets de held by the majority of alkali makers, we are ed to consider the base of such a process as being and to believe that "it will maintain its position ime to come!"

now inquire what are the grounds for assuming eblanc process will maintain its position. Is it tanding on its own merits, the decomposition of nd the recomposition of the residue into soda-ash able operation *per se?* Certainly not, though we example before us of a manufacturer purchasing with which to manufacture caustic alkali, presu- profit.

ause the Leblanc process is less nuisable than other hat we are asked to believe it will be "secure?" gree whatever can this be so, and Mr. Fletcher ter, perhaps, than anyone that the neighbourhood sting alkali works is poisoned with the excretions lanc process. Upon what, then, is the supposition s it because the process is practically and theoreti- ect? No waste of substance, no power expended ng useful work? By no means. The waste of nd limestone are serious items, and it is upon the f these substances for use over again that Mr. eems to have based his opinions as to the stability ess of Leblanc.

be the only props upon which the poor old process we fear it is in a very bad way, as when the f the sulphur from vat-waste, producing at the regenerated carbonate of lime, comes to be looked in the face, the absurdity of the proposition is If the sulphur once used in the process is to be at all, it must be done while some other useful ing executed, so that the cost can be thrown on er" operation.

and partially dry vat-waste usually contains about nt. of water and not more than 15 per cent. of he whole of which is not capable of extraction vatting of the black-ash has taken place in closed The value of 15 per cent. of sulphur at threepence r ton is 3s. 9d., out of which has to be paid the xtraction and the capital charges incidental to plant atus, not forgetting the cost of carbonic acid

It is hinted by Mr. Fletcher that there will be rated carbonate of lime to be used over again, as revenue; but an analysis of partially dried vat- show us at once the unsatisfactory nature of the hich would be obtained. The following figures omposition of partially *dry vat-waste*:—

Water	17.84
Lime	6·12
Carbonate of lime	22·72
Calcium sulphide	34·60
Magnesia	1·22
Oxide of iron and alumina	2·50
Silica	3·80
Coke	8·20
	97·00

What we argue is, that as the vat-waste is the only outlet for the impurities of the Leblanc process, the iron, alumina, and silica, it is wrong in principle to stop up that outlet. We have had some sad experience in an attempt to use a limestone rich in silica in the Leblanc process, and would certainly hesitate to employ a parcel containing what even first-hand regenerated carbonate of lime would hold according to the foregoing analysis, unless we were so badly situated that no other kind could be obtained.

No. The Leblanc process is doomed. It answered very well for days when but little science was imported into manufacturing chemistry, but we are rapidly approaching that time when carbonate of soda will be made from salt without the production of any waste product whatever to pollute the air, and our streams will cease to be polluted with chloride of calcium, on account of the chlorine so combined being turned into bleaching powder. When we are able to produce a ton of bleaching powder and a ton of soda-ash from every ton of rock-salt employed, with only one-twentieth of the sulphur now found necessary, which theoretically is possible, not only will the Leblanc process cease to exist, but the ammonia process will have to look to its laurels.

To hold the opinion that a process like that of Leblanc is secure, and will maintain its supremacy for many years to come, seems to us a dangerous indulgence, especially in these days when even the industries of a few thousand years have been swept away during a single decade by the whirling blast of chemical discovery.

NOTES ON CRUDE CARBOLIC ACID AND ITS SUBSTITUTES.*

THE general characters of carbolic acid are well known. The better qualities of the commercial product are well represented by the articles sent out by Messrs. F. C. Calvert and Co. Their No. 1 carbolic acid in the form of colourless crystals may be regarded as chemically pure and absolutely free from higher phenols, the proportion of which latter gradually increases in the lower grades, till the liquid known as No. 5 carbolic acid consists chiefly of cresylic acid, with small proportions of higher homologues. For ordinary disinfecting purposes such an article appears to be fully as serviceable as pure carbolic acid, but according to Dr. Tidy this statement does not extend to the lime compounds of cresylic acid, which are said to be practically valueless as a disinfectant, whatever may be the value of the carbolic compounds with lime. Besides lime a great variety of other substances have been employed and patented as bases for the manufacture of carbolic powders, such as sulphite of lime, siliceous residues, kieselgühr, limestone, spent gas-lime, soluble salts, borax, and many other substances.

Although the term "carbolic acid" has been extended commercially so as to include products consisting chiefly of carbolic acid, it appears a straining of its legitimate function to apply it to products from which the real carbolic acid has been abstracted. This, however, is often done, and "carbolic acid" and "carbolic acid powders" are sold in open market in which the real carbolic acid is conspicuous by its absence. But if the inexact description of cresylic acid as "carbolic acid" is objectionable, the matter becomes more serious when the article is purposely mixed with creosote. This has been done in cases within my own knowledge to the extent of 50

* Abstract of a paper read by Mr. Alfred H. Allen, F.I.C., F.C.S., at the Pharmaceutical Conference in Manchester, August 30th, 1887.

per cent., the carbolic acid and carbolic powders sold to corporations and local boards affording a fertile field for the operations of the blender.

Another practice which is increasing is the complete or partial replacement of carbolic or cresylic acid from coal-tar, by the mixture of phenoloid bodies obtained from the oils produced by condensing the waste gases from coke-ovens and blast furnaces. Blast-furnace creosote oil is now produced in enormous quantities in Scotland, and has already found an extensive application for pickling timber, for producing the "Lucigen" and "Luminator" lights, and as liquid fuel. It contains from 25 to 35 per cent. of phenoloid bodies soluble in caustic soda, as against 5 to 10 per cent. in the coal-tar creosote of London make from Newcastle coal.

Here, then, is a cheap source of phenoloid bodies, but it is evident that the unacknowledged substitution of them for coal-tar acids is objectionable, even assuming them to be comparable to the latter in antiseptic value. Results show that a very great similarity exists between the phenoloids of low temperature tars, whether they be obtained by the distillation of wood or shale, or by the condensation of the gases from blast furnaces, coke-ovens, or gas producers. In minor, though important points, differences exist, but they present a far greater resemblance to each other than they do to the coal-tar acids

The production from blast-furnace tar, and at a cheap rate, of a substance closely allied to wood-tar creosote, appears likely to furnish us with a new and valuable antiseptic. The Eglington Iron Company are preparing to produce it on a large scale, and are introducing it on its own merits, with a full admission of its nature and origin, instead of surreptitiously selling it or using it for adulterating carbolic acid. The name they have adopted for their product is "Neosote," which signifies new preserver, or new preservative. But they recognise the highly complex nature of the mixture of phenoloid bodies obtained by treating their blast-furnace tar with soda, and hence all their "neosote" is subjected to a further process of purification. Experiments purposely made to test its antiseptic value indicate that it is fully able to compete with crude cresylic acid, whilst its caustic properties are much less marked than those of the coal-tar product. But while there appears to be a useful and legitimate field for the properly purified phenoloids from blast-furnace and allied tars, it is only right to state that there are already in the market products of a very crude and objectionable character, the illicit introduction of which may seriously affect the public confidence in an article which I believe has a fair future, if judged on its intrinsic merits.

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

(Continued from page 114.)

We now come to the Weldon process as it is practised amongst us to-day. In the first place, we have to deal with the liquor from the stills—the residual liquor in fact—from the manufacture of chlorine. The acid used to dissolve the mud varies very much in its composition, according to the pyrites used in the manufacture and the quality of the salt-cake turned out in the first portion of the alkali process. If we take the condensed acid to possess a mean gravity of 30° Tw. (1·15 sp. gr.), and made from Tharsis pyrites, we shall find it to contain generally about 5·6 grammes per litre of sulphuric acid (H_2SO_4), and about 0·56 grm. per litre of arsenious acid (As_2O_3). When high strength ash or caustic is rem ry rich salt-cake has to be prepared, and in this tower salts" are contaminated to a much r sulphuric acid. In one case specially ourity, we found as much as 18·0 grms. cid is made from the "Hargreaves" nt of sulphuric acid is very much gramme per litre, making it the manganese recovery the impurities introduced very large extent, producing corresponding variations in the residual still-liqu The amount of iron and alumina salts generally present "tower acid" average about 0·08 gramme per litre of ir peroxide and 0·4 gramme alumina.

The still-liquors contain free chlorine in solution a suspended peroxide of manganese, both in varying quantiti The usual amount of free chlorine in well steamed liquor about 0·05 grm. per litre, and from 1·0 to 1·5 grms. of p oxide of manganese is found in suspension. If the liqu were neutralised with lime, which they were in the early da of the process, the free chlorine would oxidise some of t manganese, throwing it out of solution and causing k thereby; but when carbonate of lime is used, the escap carbonic acid mechanically drives it out of solution, and goes away in its company. Besides these two substanc still-liquor also contains about 12 grammes per litre of fi and undecomposed hydrochloric acid, and the first step whi the manufacturer of chlorine has to take is to secure t neutralisation of this acid. The neutralisation of this a effects the partial purification of the liquor in another wa which may be best seen by studying an analysis of the settl still-liquors :—

	Grammes per Litre.
Mn O	48·52
Ca O	62·24
$Si O_2$	2·34
Mg O	3·31
$Al_2 O_3$	6·14
$Fe_2 O_3$	0·72
SO_3	3·43
Free H Cl	11·86
$As_2 O_5$	0·26

Sulphate of lime is more soluble in an acid than in a neut solution, and therefore the effect of neutralisation is to p cipitate the sulphate to a large extent, and also to decomp the chlorides of aluminium and iron, the oxides of which also precipitated. During the process of neutralisation, m of the silica is rendered capable of easy deposition, and in neutral solution the major part of the arsenic is thrown of solution as arseniate of alumina or iron, so that if operation is properly performed we have a substantially p chloride of manganese. If magnesia should be present in raw materials it is not eliminated in the neutralising well, carbonate of lime does not precipitate magnesium sal though lime itself is capable of so doing. Magnesia c however, be eliminated by proper treatment in the oxidis a point to which we shall revert later on.

We have already mentioned that if the operation neutralisation is properly conducted, a substantially p chloride of manganese solution is the result; but in pract the purity of the neutralised liquor depends also on the sett capacity, and especially does the "base" in the settled m depend upon it. In a works possessing only 25 cubic f of settling room per ton of bleaching powder made per w it was found very difficult indeed to keep the "base" k and an analysis of the liquor going into the oxidiser show alumina in considerable quantities, an addition to the n tralised liquor settlers set everything right at once. T silica, which is brought in by the agency of lime and lim stone dust, is a light precipitate, and so also is the oxide iron and alumina, so that unless about 80 cubic feet of set room is provided per ton of bleaching powder made week, the chlorine maker will always be troubled with evils resulting from dirty liquor.

The following analyses will serve to show the composit of the liquor being used in the oxidiser from two works, first *a*, possessing only 24 cubic feet of settling room per of bleach; the other, *b*, having 134 cubic feet. The res are given in grammes per litre :—

		a.	*b.*
Soluble.	Mn O	49·62	51·86
	Ca O	62·04	53·77
	$Si O_2$	4·32	0·78
	Mg O	3·74	2·34
	$Al_2 O_3$	1·20	0·66
	$Fe_2 O_3$	trace	trace
	SO_3	1·85	0·44
	$As_2 O_5$	none	none

	a.	b.
$Si\ O_2$	2·22	No insoluble matter, the liquors being quite clear and bright.
$Fe_2\ O_3$	0·28	
$Al_2\ O_3$	3·51	
$Mn\ O_2$	0·47	
$Ca\ SO_4$	0·42	

ud which settles out from the neutralised liquor, con- f course all the impurities which are precipitated by bonate of lime. A sample of this deposit collected any months, after being washed and dried in the air, ed of a mixture of the following substances :—

$Ca\ SO_4$	52·05
$Si\ O_2$	10·80
$Fe_2\ O_3$	2·19
Alumina	3·71
$Mn\ O_2$	6·25
$As_2\ O_3$	0·86
Water, etc. (by difference)	24·14
	100·00

to say the blackish-brown air-dried mud would con- out 6 per cent. of peroxide of manganese; but when riatic acid from the Hargreaves process is employed much less sulphate of lime mixed with it, so that we ften found the dried mud to contain not less than cent. of peroxide, and have actually sold it in the condition to the glass bottle makers to replace the manganese they use in the ordinary course of their s. The first step then is in securing a fairly pure e of manganese liquor, and if this be done there is very ifficulty in the subsequent operations.

next step is in the oxidiser, and we may illustrate the on by reference to a batch blown in the year 1874, so r readers may be able to judge how far improvements een effected since that date. It was an exceptionally atch, but being made with very clean liquors will illustrate our former remarks upon the necessity of y eliminating the basic impurities. A quantity of bic feet of well settled neutralised manganese liquor into the oxidiser, and 171 cubic feet of milk of lime r precipitation, 56 cubic feet of excess lime were then the blowing in of air commencing from the moment t lime was introduced, the temperature of the liquor 50° C. The batch therefore measured 1,140 cubic feet, possible or "total" $Mn\ O_2$ present was 47·68 ounces ic foot, or similar figures for grammes per litre. In per cubic foot this amounts to 2·98. After injection or four hours oxidation had ceased to advance, and an ation of the contents of the oxidiser showed that 81·5 t. of the manganese had been oxidised to peroxide, al $Mn\ O_2$ existing being 38·24 grammes per litre, or per cubic foot, the base being 0·75 equivalents for uivalent of Mn. O_2. At the end of the fourth hour bic feet of manganese liquor ("final liquor") were and the blowing continued for forty-five minutes the batch being then run off, measuring 1,330 cubic ntaining 2,952lb of $Mn\ O_2$, and containing in grammes e, 46·08 total $Mn\ O_2$, 35·52 actual $Mn\ O_2$ showing a age oxidation of 77·1 and a "base" of 0·55. The r bases at the end of the fourth hour show that the ed in making up this batch was 1·44 equivalents. injected into the oxidiser during the 4¾ hours the on was "on" amounted to 430,930 cubic feet, and as al $Mn\ O_2$ produced was 2,952lb. this is equal to 146 eet per lb. of $Mn\ O_2$, or calculated in another way, cubic feet per minute. The oxidiser was 11 feet in er, so that before final liquor was added, the depth of through which the injected air would have to pass be 11·7 feet, and it has been fairly well established lditional depth of column, within certain practical is equal to additional air. A very good rule in ing the size of an oxidiser is to allow 15 cubic feet of square foot of area *per minute, and to have the of liquor about 12 feet in depth.*

From the foregoing figures it will be seen that about twelve times as much air is injected as is theoretically necessary for the oxidation of the manganese, a result quite different to the instructions of Weldon in his patent of 1868, wherein he states that the best rate for the injection of air is such as only pure nitrogen is found escaping, the oxygen having been entirely utilised in oxydising the manganese.

Weldon mud varies very much in the proportion of its various amounts of contributory bases: in some the lime preponderates, in others the manganese protoxide is in excess; and in good mud the amounts of iron peroxide, magnesia, and alumina should be very small indeed. After running off from the oxidiser and settling, good mud should become reduced to four-tenths, or even to one-third of its original volume, its composition being expressed in grammes per litre in the following table, which exhibits the results of analyses of manganese mud made in various factories during the years 1874-1877.

	a.	b.	c.	d.	e.
$Mn\ O_2$	69·44	71·04	110·82	53·76	67·84
$Mn\ O$	23·31	17·22	24·81	13·73	18·66
$Ca\ O$	15·01	11·56	44·00	10·92	10·92
$Ca\ SO_4$	20·19	4·11	8·09	4·41	7·12
$Si\ O_2$	1·90	0·72	4·00	1·44	1·37
$Al_2\ O_3$	1·22	0·26	1·14	0·36	0·26
$Fe_2\ O_3$	0·21	0·14	0·08	0·11	0·05
$Mg\ O$	0·22	0·48	1·14	0·87	0·14

As contrasted with the above, we are able to give the analysis of a batch blown in Widnes during the summer of 1869, very soon after Mr. Weldon had patented the application of excess lime:—

	Grammes per Litre.
$Mn\ O_2$	64·98
$Mn\ O$	19·86
$Ca\ O$	22·32
$Ca\ SO_4$	14·22
$Si\ O_2$	2·23
$Al_2\ O_3$	0·26
$Fe_2\ O_3$	traces
$Mg\ O$	0·22

These figures show that since 1874 no material improvement in the so-called Weldon process has taken place.

(To be continued.)

THE MEETING OF THE BRITISH ASSOCIATION IN MANCHESTER, 1887.

On Wednesday evening, August 31st, one of the most brilliant meetings of scientific men ever held in the United Kingdom, took place in the Free Trade Hall, at Manchester, to hear the address of the President, Sir Henry Roscoe. Professor Williamson, in his introductory speech, stated that after an experience of a quarter of a century he had never before attended any previous meeting at which there were so many distinguished men.

The President's address was an extremely interesting dissertation, and we are sorry that, owing to its extreme length, we cannot reproduce it here, dealing as it did with fifty years of progress, and showing clearly the assistance science had been to the manufacturing community. The history of Dalton's researches alone makes the address of value to local students of science, showing as it does the early work done by the Literary and Philosophical Society of this city. The constitution of matter; the revelations of the spectroscope; chemical science; the progress of organic chemistry; vital phenomena, and the relation of chemistry to pathology;—were each dealt with in turn, the learned President treading at the close of this section of his address on a much debated ground. He said :—"For we learn that the symptoms of infective diseases are no more due to the microbes which constitute the infection than alcoholic intoxication is produced by the yeast cell, but that these symptoms are due to the presence of definite chemical compounds, the result of the life of these microscopic organisms. So it is to the action of these poisonous substances formed

during the life of the organism, rather than to that of the organism itself, that the special characteristics of the disease are to be traced; for it has been shown that the disease can be communicated by such poisons in the entire absence of living organisms." In conclusion, Sir Henry interpolated the following remarks, which deserve to be taken to heart by all those interested:—"Had time permitted I should have wished to have illustrated this dependence of industrial success upon original investigation, and to have pointed out the prodigious strides which chemical industry in this country has made during the fifty years of Her Majesty's reign. As it is, I must be content to remind you how much our modern life, both in its artistic and useful aspects, owes to chemistry, and, therefore, how essential a knowledge of the principles of the science is to all who have the industrial progress of the country at heart. This leads me to refer to what has been accomplished in this country of ours towards the diffusion of scientific knowledge amongst the people during the Victorian era. It is true that the English people do not possess, as yet, that appreciation of the value of science so characteristic of some other nations. Up to very recent years our educational system, handed down to us from the Middle Ages, has systematically ignored science, and we are only just beginning, thanks in a great degree to the prevision of the late Prince Consort, to give it a place, and that but an unimportant one, in our primary and secondary schools, or in our universities. The country is, however, now awakening to the necessity of placing its house in order in this respect, and is beginning to see that if she is to maintain her commercial and industrial supremacy the education of her people from top to bottom must be carried out on new lines."

On Thursday, September 1st, Dr. E. Schunck, the President of Section B, delivered his address in the Lecture Theatre of Owens College. He said that the Section would hardly expect to hear from him a review of the progress of chemistry during the past half century, but he preferred to call attention in a few words to the chemistry of other days as he knew it, and the chemistry of the present time as known to them, and to point out what he considered to be the chief characteristics of each. Later on Dr. Schunck asked the question—Will chemical science go on expanding and developing during the next few generations as it had done in the course of the last hundred years? Will discovery follow discovery and fact be added to fact until the record occupied not a few volumes only, but a whole library? Will systematic chemistry—*i.e.*, the history and description of all possible combinations of the elements—have any limits? Dr. Schunck said he was inclined to answer in the negative. All human institutions passed through the same phases; they had their rise, they culminated, and decayed; and he did not see why the science of chemistry should form an exception. He thought it probable that in the course of time, at the rate at which we were now progressing, nearly all possible compounds would have been prepared, all the more important chemical facts would have been discovered, and pure chemistry would then be practically exhausted, and would be in the same condition as systematic botany and mineralogy now were. All the materials with which the science had to deal having then been brought together, he did not think chemists, satisfied with past achievements, would cease to work, confining themselves to practical questions and the history of days gone by. The science would continue to develop, but it would be in other directions than those previously pursued. In conclusion, Dr. Schunck made some reference to technological matters, and to the various chemical arts and manufactures for which the Manchester district was noted. He said that at the last meeting of the British Association ir [illegible] r a report on the condition, at that time, of ma [illegible] hemistry in the South Lancashire district by [illegible] oe, the late Dr. Angus Smith, and imself, [illegible] he Chemical Section. A similar ort sh [illegible] ss made in chemical technology th [illegible] been interesting. Great changes ta [illegible] he period that had elapsed, [illegible] li trade; and quite a new [illegible] eloped—that of the coal-tar colours. There was a difficulty, however, in the way of obtaining reliable information as to details. It could hardly be a matter of surprise, he thought, that our manufacturers, considering the active competition to which they were exposed, and the disadvantages under which they laboured in consequence of the exclusiveness of foreign nations, should be loth to furnish information which would benefit their rivals in trade. Several interesting papers on branches of chemical industry by gentlemen well versed in them would, however, be read before the Section, and these would, to a great extent, make up for the want of a general report. In the Chemical Section of the Exhibition there was a fine collection of chemical products. To some it might seem that this Jubilee Exhibition showed the manufacturing industry and prosperity of this district at least at their highest state of development; that they are now at their meridian, and in the futute are doomed to decline. If that be so—and there were certainly indications which seemed to favour that view—it would be well for those whose visits here were only occasional to take especial note of the present state of things, so as to be able to compare their impressions when they next visited us with those now received, since gradual changes in communities, as in individuals, were more patent to casual observers than to those who are always on the watch.

A distinctly commercial aspect was on Friday imparted to the proceedings of the Chemical Section. There was a good attendance, and the members at once entered, with Mr. A. E. Fletcher, the chief inspector under the Alkali, etc. Works Regulation Act, into a discussion of the present position of the alkali trade (a portion of which paper may be found on page 126). Mr. Fletcher appeared as the champion of the process worked out by Nicolas Leblanc exactly one hundred years ago, for the manufacture of soda from common salt by fusion with carbonate of lime and charcoal. He admitted that this system was seriously attacked by the ammonia-soda process which had forced itself into prominence since 1877, but he believed that it would yet hold its own. He described the great advances which had been made in this important branch of industry of late years, and the audience heard with gratification that though the Germans are making themselves felt in alkali manufacture they could never hope to supersede the English producer, for the very sufficient reasons that the raw material is derived from this country and that we are more favourably situated in the matter of proximity to seaports. M. Solvay and Mr. Ludwig Mond, inventors of processes differing from that of Leblanc, took part in the discussion. The composition of some coal oven tars formed the subject of a paper by Professor Lunge of Zurich; and he was followed by Mr. Watson Smith, of Owens College, who delivered an address upon the constituents of the light oils of blast furnace coal-tar from some works in Scotland. As an evidence of his labours in the department of chemistry, Mr. Smith exhibited a piece of flannel, the colour of which was derived from the waste gaseous products hitherto escaping in flames from blast furnaces.

A paper which attracted considerable attention was that by Mr. Charles O'Neill, who discussed the extent to which calico printing and the tinctorial arts have been affected by modern colours. At the close of the sitting an adjournment was made to the Jubilee Exhibition, where for two hours the members enjoyed the exclusive possession of the Chemical Section.

A sub-section dealing with organic chemistry sat in the Physical Theatre of the College under the presidency of Professor Thorpe.

Russian Duties on Chemicals.—It has been decided by the Russian Customs authorities that the duty on ammonia salts shall be as follows:—Salammoniac (chloride of ammonia), carbonate of ammonia, and all salts of ammonia excepting sulphate, raw and refined, as well as liquid ammonia, 1 rouble 20 copecks per poud (= about 11s. per cwt.); sulphate of ammonia, 50 copecks per poud (= about 4s. 9d. per cwt.).

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Our Book Shelf.

MODERN HIGH FARMING: A Treatise on Soils, Plants, and Manures. By Francis Wyatt. New York: C. E. Bartholomew.

This treatise on soils, plants, and manures is addressed to the agriculturist of America, but with even greater force it might be also addressed to the agriculturist of Great Britain.

With their vast tracts of virgin soils the many agriculturists of the great Continent of America have not yet come to reap sufficiently poor crops as to set before their mind's eye the absolute necessity of farming scientifically. In Great Britain scientific farming is in the minority; farmers are unable to appreciate the differences between the various qualities of manures, and thus become an easy prey to dealers, who persuade them to buy nitrate of soda and foreign guano for use at home, while they send away to France, Germany, and the West Indies the sulphate of ammonia which is made here. The American agriculturist has not yet discovered the great need for manures; but the time will come when he will have to be as spry as the inhabitants of those countries who have been farming since the world began. The treatise of Mr. Wyatt's will be an introduction to more serious reading in this direction, though we opine that most farmers will find the pages serious enough if they have not received a scientific education.

The volume is a very readable one, and a perusal of page 40 shows us that there is just as much "human nature" in the States as there is—or was—in this country. But the bogus manures which were at one time a disgrace to British trade may now fairly be said to have died out, and the existence of agricultural societies and their chemists have put a very different complexion on the manure trade. Chapters ix., x., and xi. are extremely valuable chapters from a practical point of view, and well worth the farmer's study, while the whole work may be read with interest by every manure manufacturer and dealer in the land. Whatever we read we can always learn something, and we can confidently recommend this treatise to the British farmer as a plain and simple statement of facts not generally known, written by an expert who evidently knows well the most intimate details of all he writes about concerning high farming.

Correspondence.

THE CAPACITY OF CARBOYS.

To the Editor of the Chemical Trade Journal.

Sir,—We use a few carboys of what is known to the trade as "tower salts," that is, crude hydrochloric acid. These are bought at per carboy, which we have hitherto assumed to be 10 gallons, the normal capacity of a carboy. Having a suspicion that some of them were not up to this mark, I had a number weighed, with the following results, the gallons, of course, got by calculation :—

Net Weight of Acid.	Degree, Tw.	Gallons.
96	30	8·3
107	30	9·3
104	30	9·0
90	31	8·0
104	30	9·0
118	29	10·3
118	30	10·2
116	30	10·0
104	30	9·0
112	30	9·7
113	30	10·1
104	32	9·0
100	32	8·6
108	29	9·5
111	29	9·6

Thus we got an average of 9·3 gallons per carboy.

ventured to write this in order, if possible, to get some of your readers' opinion whether this is—well, not a cheat, but a "form of competition." Perhaps some one else will weigh a delivery. In future I shall have a specified minimum weight and density named. P. H.

GERMAN CHEMISTS.

To the Editor of the Chemical Trade Journal.

Sir,—Recent correspondence in your journal has led to the discussion of several interesting and important matters concerning English and German chemists and chemistry, to which I am constrained to contribute to some extent. I write as a trained chemist of many years standing, also a chemical author, and as a manufacturer of various substances which are the subjects of my own patents. As such, I consider not only that German chemists should not be employed by English manufacturers on the ground that charity begins at home, but also upon the economical basis that it pays better to employ Englishmen. There are plenty—too many, indeed—of well-qualified and thoroughly trained intellectual and accomplished English chemists. Why then should we employ Germans, who rarely lose an opportunity of turning to the account of their own country as against England the knowledge and technical information which they gain in our works? Moreover, my experience of German chemists is not altogether to their advantage in the way of training and ability. Indeed, I have generally found that while their confidence and conceit is practically without limit, their manipulation and the power of application of chemical knowledge to the benefit of industrial processes are much more confined. I have known several Ph.D.'s, including Englishmen who studied at German universities, who could discuss to little advantage the atomic structure of organic compounds, and theorise to any extent about the constitution of substances which are the playthings of so many laboratories of to-day, but who positively could not be trusted to make the combustion of the simplest organic compounds! Erratic results thus obtained have not infrequently formed the basis of high-flown speculation. How much of the work, accounts of which are published now-a-days in German publications, will have to be repeated? From my own capability of judgment, I should think at least four-fifths! Then Englishmen should remember (as one of your correspondents has suggested) that in all probability some German chemists are subsidised.

Further, what English chemist, who is also an inventor, has not realised the shameful objections that are raised by the German Patent Office authorities to their applications for German patents. Germans can readily patent their inventions in this country; but Englishmen are fearfully handicapped in the way I have mentioned. Many of the objections raised are not merely frivolous, but really based upon inaccuracy of chemical information. I know of at least one instance, moreover—be it stated to the shame of Germany,—that an Englishman who had failed to obtain a German patent for an important invention which he had made, was subsequently chagrined upon learning that a German, who afterwards applied for a German patent for the same invention, readily obtained it. The fact is that our free-trade notions have been carried into mischievous effect, not only in politics, but also in industrial chemistry and every other direction. I have no disrespect or dislike for Germany and Germans; but I must add, I like my own country a great deal more, and think more highly of my countrymen. We are over-populated as a country with our own people; why, then, should we encourage further competition and sacrifice our interests to those of German chemists, in addition to German princes.

I am, etc., "England for the English."

*** The demand for last Saturday's issue of The Chemical Trade Journal, containing the leading article on the Future of the Benzol Market, was so great as to necessitate our printing a second edition during the early part of the week.

ON THE PRESENT POSITION OF THE ALKALI MANUFACTURE.*

At the request of the Committee of the Chemical Section of the British Association, I have prepared a paper on the present position of the alkali manufacture.

It seemed fitting that I should accede to this request, as at the last meeting of the British Association, held in Manchester in the year 1861, a report on the alkali manufacture and some other chemical manufactures, carried on in Lancashire, was prepared by my predecessor in office, the late Dr. Angus Smith, in connection with then Professor Roscoe and Dr. Schunck. Since the date of that report 26 years have passed away, years fraught with a great development of the chemical arts, and with change in the process of manufacture.

It will not be necessary for me to trace minutely the various steps of progress made in the soda industry during the whole of this interval, as interim reports on the same have been made.

In 1883, the late Mr. W. Weldon read before a meeting of the Society of Chemical Industry, a paper on the then condition of the soda manufacture, and in 1884 continued his observations on the same subject in his address as president of the society.

In 1886, Mr. E. K. Muspratt, succeeding to the same office, gave also much information on the progress of the alkali industry. I limit myself, therefore, to a brief mention of the progress which has taken place since the report of 1861, and propose to give a more detailed account of those changes which are now taking place, and indicate the influence they must have on the immediate future.

And it is fitting that this review should be made now, in this year, which besides being the Jubilee year in the reign of our beloved Sovereign, is the centenary year of the Leblanc process. It was in the year 1787 that Nicolas Leblanc worked out his process for the manufacture of soda from common salt by fusion with carbonate of lime and charcoal. Two years later, under the patronage and with the help of the Duke of Orleans, apparatus was erected at St. Denis to carry on the process on a commercial scale. Success attended the enterprise, which was, however, in 1793, cut short by the political convulsions of the French Revolution. Subsequently redress and compensation were promised to Leblanc and his friends. These were, however, so long delayed that the inventor ultimately sought refuge in a workhouse, where he committed suicide. It is well for us as a nation to note, in looking back over the last fifty years, that whatever ills may have beset the paths of inventors, and they have always been legion, they have not arisen from the violence of social convulsion, nor from any general disturbance of our national prosperity.

During the whole century which has followed the first publication of Leblanc's process, it has successfully withstood the attacks of all rivals, and although now its supremacy is more fiercely attacked than at any previous period, I think I shall be able to show that its foundations are still secure, and that it will maintain its position for many a year to come.

The year 1861, the date of the report referred to as having been read before this Association at its last meeting in Manchester, may be taken as marking a period when, for the manufacture of soda in the various forms usually supplied in commerce, the Leblanc process had firmly established its supremacy over all others. It had successfully repelled the attacks of many assailants. The promoters of rival methods had invariably met with commercial disaster, so that the manufacturers engaged in the trade had come to a settled conviction that their process was complete, and that all further action on the part of inventors should be steadily resisted.

Nor was this state of feeling unnatural. The general prosperity of the country, especially that of the manufacturing class, was advancing with rapid strides. The demand for soap, glass, textile fabrics, and the various other articles which are largely dependent on soda for their production,

* read by Mr. A. E. Fletcher before the Chemical Section of the Association in Manchester, Friday, September 2nd, 1887.

tantly on the increase, so that the problem before maker was how best to press on the manufacture ase the output, rather than how to cheapen the pro- even to improve the quality. The demand for ment and the exercise of more care in the manufac- e from without, rather on sanitary than on com- grounds. It was in 1863, two years after the date mentioned, that the first Alkali Works Regulation passed, with the object of obtaining a more complete tion of the muriatic acid discharged in the process, ough that acid was valuable, the manufacturer had apparently to attend to its complete collection. At all the acid chloride of manganese, the waste liquor chlorine stills, was allowed to flow away, and the St. Helens to prevent the continued fouling of Brook, together with a desire to save the manganese, the manufacturers to make trial of Weldon's manga- very process. This process was elaborated at the orks of Messrs. Gamble and Sons, St. Helens, the years 1866 and 1869.

(To be continued.)

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

from the severe wages rupture in the paraffin ture, there is this week to be noted no additional f mark as attaching to the local market for chemicals. g powder holds its own, although with nothing to nd of the various other lines (exclusive of paraffin), and caustic sodas present the steadiest fronts perhaps, however any perceptible advantage scored so far as ns are concerned. Bichromate manufacturers still m an emphasised slackness of demand which cannot be laid at the door of temporary depression in the actories, and is therefore somewhat of a puzzle to nmediately concerned. The shale labour dispute unallayed, and most of the works continue practically ctive, although on Thursday last these (by agree- ong the makers) were thrown open to such stragglers to recommence work on the masters' terms. On ket paraffin products are naturally scarce, with a o the rise, this being particularly the case with scale, d spirit. Efforts at a common ground for Scotch and n refiners in dealing with the market position of still in progress, and there is considered to be good s of a practical result being realised. Current quota- e:—Soda crystals, 46s. to 47s. net Tyne; alum £4. 17. 6d., less 2½ °/₀ Glasgow; borax, English £31, and boracic acid, £46, net Glasgow; soda 52°, 1d., less 5 °/₀ Tyne; caustic soda, white, 76°, 70/72°, £7. 10s., and cream, 60/62°, £6. 5s., less iverpool; bicarbonate of soda, 5 cwt. casks, £6., t. casks, £6. 5s., net Tyne; refined alkali, 1⅛d., , Tyne; salt-cake, 23s. 6d.; bleaching powder, to £7. 17s. 6d., less 5 °/₀ Glasgow; bichromate of ½d., and of soda, 3½d., less 5 °/₀ f.o.b. Glasgow; soda, 8s. 9d.; chlorate of potash, 6d., less 5 °/₀; of ammonia, £12s. 10s., f.o.b Leith; paraffin scale d., and soft, 100°, 1¼d. to 1⅝d.; wax, semi- 120°, 2¾d. to 2¾d.; spirit, 7d. (strong), and burning to 5½d., Scotch consumption, English and Irish lly less; sulphate of copper, £14, less 5 °/₀. Clyde or the week include 2,615 barrels rosin, 1,682 tons nd 35,650 bags of sugar.

THE TAR PRODUCTS MARKET.

s begin to feel that a crisis is fast approaching. s very slack, and no one seems to be anxious to buy t prices, as it is feared that an extraordinary effort is ale to sustain present values until October or r has passed away. From several quarters we have en to task for our last week's leader. We have but cts and based *our* opinions on them; *other* people erty to do the *same, and we will watch with interest* who is right in the long run. Anthracene and carbolic acid are still firm, the former at 1s. 3d. f.o.b. London for A quality, while 60's carbolic fetches 3s. 9d. at the same port. From what we hear there is not likely to be any improvement in pitch for some time to come, and the producers of it may commit the same error as last year, in not selling when they had the opportunity.

THE SULPHATE OF AMMONIA MARKET.

PRICES at all ports are flat, and though continental makers are endeavouring to keep up prices, their labours are not much appreciated on this side. Hull is quoted at £12. 2s. 6d. to £12. 3s. 9d. for prompt delivery, but £11. 10s. only is offered for October-December, and it is reported that some producers are willing to sell at this figure. No doubt this decline is in great part due to low quotations from Beckton, who now are asking £11. 17s. 6d., though outside makers say £12. 2s. 6d. to £12. 3s. 9d. Leith price is £12. 0s. 0d. nominal, as there is very little to be had, and Scottish dealers are seeking their supplies in England. The last three months in the year are trying times for sulphate of ammonia makers, and great tact is required in carrying on such a business in the fall of each year.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

11610. J. E. WARREN and F. A. CLOUDMAN. For improvements in means or apparatus for use in effecting the recovery of chemicals from spent liquors of pulp digesters. August 26.

11653. F. P. E. de LALANDE. For improvements in the manufacture of caustic soda and potash. August 27.

11658. E. EDWARDS (a communication from R. Jöberg, of Sweden). For improvements in explosives. Aug. 27.

11672. M. M. BAIR. For improvements relating to the volatilisation of lead, antimony, and other substances, and to the condensation of the resulting vapours. August 27.

11689. A. H. ALLEN and R. ANGUS. For improvements in the treatment of the oil or tar obtained by condensation from the gases of blast furnaces, gas producers and coke ovens, or by the distillation of bituminous shale, and in the utilisation of the products therefrom. August 29.

11716. M. L. HONNAY. For a new or improved process for enriching pitch obtained by the evaporation of tars produced from coal. August 29.

11733. J. E. BENNETT. For improvements in the treatment of metallic chlorides for extraction of metals therefrom. August 30.

11799. R. WYLLIE. For improvements in and connected with apparatus for distilling ammoniacal liquors. August 31.

11805. S. BANNER. For improvements in treating resins, oleoresins, gums, pitches, varnishes, bitumens, and other like substances. August 31.

11821. T. SCHLOESING. For extraction of chlorine from solutions of chloride of magnesium. August 31.

11846. G. E. DAVIS. For an improved method of manufacturing alkalies. September 1.

11879. C. D. ABEL (a communication from C. Wachendorff, of Germany). For production of compounds of antimonic fluoride, with alkaline fluorides and alkaline chlorides, and the application thereof, and of known combinations of these substances to dyeing and printing. September 1.

11880. C. D. ABEL (a communication from the Actiengesellschaft für Anilin-Fabrikation, of Germany, for process for the production of azo colouring matters. September 1.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
ACIDS:—			
„ Acetic, 25 °/₀ ... ... per cwt.	0	10	3
„ „ Glacial ... ... per lb.	0	0	6⅞
„ Arsenic... ... ... per cwt.	0	12	9
„ Chromic 70 °/₀ ... ... per lb.	0	0	4½
„ Fluoric ... ... „	0	0	5
„ Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
„ „ (cylinder) 30° Tw. ... „	0	2	6
„ Nitric, 80° Tw. ... ... per lb.	0	0	2¾
„ Nitrous... ... ... „	0	0	2¼
„ Oxalic ... ... „	0	0	4½
„ Sulphuric (fuming 40 °/₀) ... ... „	12	0	0
„ „ (Brimstone 168°) ... per ton	4	5	0
„ „ (Pyrites 168°) ... ... „	3	10	0
„ „ (spent oxide 168°) ... „	4	0	0
„ „ („ 150°) ... „	2	5	0
„ „ (Pyrites 150°) ... ... „	2	0	0
„ Tartaric ... ... per lb.	0	1	6⅞
Arsenic, white powdered ... ... per ton	10	12	6
Alum... ... ... „	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
„ = 24° ... ... „	0	0	1¾
„ Carbonate ... ... „	0	0	3½
„ Muriate ... ... per ton	22	0	0
„ „ (sal-ammoniac) ... per cwt.	34/- & 32/-		
„ Sulphate (grey), London ... per ton	12	3	9
„ „ (grey), Hull ... ... „	12	2	6
Aniline Oil ... ... per lb.	0	0	9¾
„ Salt ... ... „	0	0	8¼
Antimony... ... ... per ton	35	0	0
„ (tartar emetic) ... ... per lb.	0	1	0
Barium Chloride ... ... per ton	7	10	0
„ Carbonate (native) ... ... „	4	0	0
„ Sulphate (native levigated) ... „	3	2	6
Bleaching Powder, 35 °/₀ ... ... „	7	8	9
„ Liquor, 7 °/₀ ... ... „	2	12	6
Bisulphide of Carbon ... ... „	12	15	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... „	0	3	6
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. London, per unit per cwt	0	1	3
Benzol, 90 °/₀ „ ... per gallon	0	3	0
„ 50 °/₀ „ ... „	0	2	4
Carbolic Acid (crystallised 35°) ... per lb.	0	1	2
„ (crude 60°) ... ... per gallon	0	3	6
Creosote (ordinary)... ... ... „	0	0	1½
„ (filtered for Lucigen light) „	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C. „	0	1	3
Grease Oils, 22° Tw. ... ... per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ... „	0	13	6
oke-oven Oils (crude) ... ... per gallon	0	0	1½
„ (distilled) ... ... „	0	0	2
per (Chili bars) ... ... per ton	40	5	0
. Sulphate ... ... „	13	17	6
Oxide (copper scales) ... ... „	36	15	0
. ... per cwt.	1	17	6
ne (crude) ... ... per ton	33	0	0
(refined) ... .. . „	53	0	0
ne)... ... „	1	13	0
ide (blue bil[illegible] „	0	7	0
(bog oc[illegible] „	1	13	0
([illegible]nacin[illegible]	3	0	0
	[illegible]	2	6
		0	0
		[illegible]	0
			0
			0

	£	s.	d.
Lime, Acetate (brown) ... ... per ton	10	0	0
„ „ (grey) ... ... „	14	0	0
Magnesium (ribbon and wire) ... ... per oz.	0	2	6
„ Chloride ... . per ton	2	5	0
„ Carbonate .. .. per cwt.	1	17	6
„ Hydrate ... ... „	0	10	0
„ Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... . „	19	5	0
„ Borate .. .. per cwt.	2	5	0
„ Ore, 70 °/₀ ... ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	4
Naphtha (Wood), Solvent ... ... „	0	4	1½
„ „ Miscible, 60° O.P. ... „	0	5	6
OILS:—Castor ... ... per cwt.	1	4	9
Cotton-seed ... ... per ton	21	10	0
Linseed ... ... „	21	0	0
Lubricating, Scotch, 885°—890° ... „	5	17	6
Petroleum, Russian ... ... per gallon	0	0	5 1/16
„ American ... ... „	0	0	5 1/16
Silver (metal) ... ... per oz.	0	3	8¾
„ Nitrate ... ... „	0	2	8
STARCHES:—			
Sago ... ... per cwt.	0	8	9
Potato (farina) ... ... „	0	10	3
Sodium (metal) ... ... per lb.	0	6	0
„ Carb. (refined Soda-ash) 48 °/₀ per ton	5	5	0
„ „ (Caustic Soda-ash) 48 °/₀ „	4	0	0
„ „ (Carb. Soda-ash) 48 °/₀ „	4	2	6
„ „ (Soda Crystals) ... ... „	2	13	9
„ „ (Crystal Carbonate) ... „	5	8	9
„ Chlorate ... ... per lb.	0	0	7½
„ Borate (Borax) ... ... per cwt.	1	8	6
„ Bichromate... ... ... per lb.	0	0	3¼
„ Hydrate (74 °/₀ Caustic Soda)... per ton	8	0	0
„ „ (70 °/₀ Caustic Soda)... „	7	7	6
„ „ (60 °/₀ Caustic Soda, white)„	6	7	6
„ „ (60 °/₀ Caustic Soda, cream)„	6	6	3
„ Bicarbonate ... ... „	6	0	0
„ Hyposulphite ... ... „	5	5	0
„ Nitrate (95 °/₀) ex ship Liverpool per cwt.	0	8	9
„ Silicate (glass) ... ... per ton	5	10	0
„ „ (liquid, 100° Tw.)... ... „	4	7	6
„ Sulphate (Salt-cake) .. .. „	1	3	6
„ „ (Glauber's Salts) ... „	2	2	6
„ Sulphite ... ... „	5	17	6
Potassium (metal) ... ... per oz.	0	3	10
„ Bichromate ... ... per lb.	0	0	4½
„ Carbonate, 90% ... ... per cwt.	0	18	3
„ Chlorate ... ... per lb.	0	0	6 1/16
„ Hydrate (Caustic Potash) ... per ton	22	15	0
„ Nitrate (refined) ... ... per cwt.	1	2	0
„ Prussiate Yellow ... ... per lb.	0	0	7½
„ Sulphate, 90 °/₀ ... ... per ton	9	10	0
„ Muriate, 80 °/₀ ... ... „	9	0	0
Strontium Hydrate, 98 °/₀ ... ... „	7	15	0
Sugar, Beet ... ... per cwt.	0	12	9
„ Cane ... ... „	0	16	0
Sulphocyanide of Barium ... ... per lb.	0	0	6
„ Ammonium ... ... „	0	0	9
Sulphur (Flowers) ... ... per ton	9	5	0
„ (Roll Brimstone) ... ... „	6	0	0
Superphosphate of Lime (28 °/₀) ... ... „	2	0	0
Tallow ... ... „	22	10	0
Tin (metal) ... ... „	103	10	0
„ Crystals ... ... per lb.	0	0	6¾
Zinc (Spelter) ... ... per ton	15	0	0
„ Chloride (solution 96° Tw.) ... ... „	5	15	0

TURDAY, SEPTEMBER 17, 1887.

THE FUTURE OF BENZOL.

E the appearance of our previous article on this sub- have received many communications; but we have n able to gather from them any solace for the benzol r. It is true we have been told that the majority of llers do not share our "pessimist" views, but that tion to remodel them has not in any way influenced gment. Benzol must obey, like all other things, the supply and demand, and the producers of it can no it half a million gallons on the market more than are l without injuring it, than would be the case with any mmodity.

pretty well known how much benzol was produced 1885. It was roughly :—

	Gallons.
From gas-tar	2,000,000
From the Normanton district	96,000
,, Barnsley ,,	48,000
,, Manchester ,,	96,000
,, Tamworth ,,	60,000
,, Stoke-on-Trent ,,	140,000
Total gallons	2,440,000

end of the year some of these carbonising works were or partially so, therefore the make during 1886 was to :—

	Gallons.
From gas-tar	2,000,000
,, Normanton district	100,000
,, Barnsley ,,	25,000
,, Tamworth ,,	30,000
Total gallons	2,155,000

ng 1887 very little carbonising benzol was sent out ywhere but Normanton and Tamworth districts, and ieve that the price benzol has reached is purely arti- and that buyers will do well to hold back. If the production goes on as we believe it will, there may be roduced than most tar distillers have any idea of. Let at what could be produced :—

	Gallons.
From gas-tar	2,100,000
From the Normanton district	120,000
,, Barnsley ,,	48,000
,, Tamworth ,,	75,000
,, Stoke-on-Trent ,,	360,000
Total gallons	2,703,000

ument has been used that if benzol was ever to fall ne shilling and sixpence per gallon carbonisers would d so the maximum production would not be reached. y ask in reply, Does the experience of 1886 teach us Did not certain works continue in operation during ole time of the depression, while benzol was selling at lling and fivepence per gallon? All depends upon e carbonisers are charged for coal, and if the collieries ing to supply it at sixpence per ton, it is no use for ks to bid against them. After all it may not be the sers who have to accept the low figure when it does it may be that the two million gallons from gas-tar re to be sold at a low price—we shall see.

WATER-GAS.

III.

' year we had the opportunity of inspecting the arrange- or the production of water-gas at the works of Messrs. , Knaudt, and Co., at Essen in Westphalia, which rmerly erected according to Strong's patents, so far as erheating of the steam was concerned. A double ator was at first *employed, heated by* means of the waste gases formed during the warm blast; but in practice it soon became apparent that if the generator gases were completely burnt by the over or top blast, the flying ashes carried over rapidly destroyed the lining of the regenerator. After some time the upper draught was discontinued, so that the regenerator chambers were only heated by the unburnt escaping gases to about 500° C. By this means the superheating of the steam was effected in a small degree, and it was found that the consumption of fuel did not increase to such an extent as had been expected. On the other hand, the productive power of the apparatus rose very considerably, as the entire quantity of air supplied by the blast, instead of being used, half as an upper and half as an under current, was used entirely as an under current, so that the warm blast only occupied half the time it formerly did, while the production of water-gas rose to double, viz., from about 120 cubic metres per hour to from 250 to 300 cubic metres, without any noticeable increase in the consumption of "breeze" per cubic metre of water-gas.

Theoretically, as stated above, the heat necessary for the decomposition of steam amounts to 775 calories per cubic metre; to this must be added that contained in the issuing water-gas at about 1,200° C. with about 377 calories per cubic metre, consequently about 1,152 calories altogether. If we assume that the entire heat disengaged in the cooling ring, damper, damper frame, and scrubber, originates from the water-gas, and desire to calculate the necessary temperature from this, we arrive in round numbers at 1,300° C. For a gas production of 360 cubic metres per hour, 2 cubic metres of cooling water were heated 73° C. If the steam be previously heated to 800° C., 0·4 kilo per cubic metre of water-gas would have brought with it 160 calories; if the same is only superheated to half this, or to 400° C., this is a deficiency of 80 calories, or about 7 per cent. of the total requisite heat.

In practice, the matter turns out quite different. On an average, 1 kilo of coke is used per cubic metre of water-gas. In water-gas then, there are latent 3,000 calories of heating value; in the generator 4,000 calories more; so that compared with these 4,000 calories latent in the generator gases, the 80 calories which are lost through less superheating play but little part.

The consumption of fuel amounts to about 1·2 kilo of small coke per cubic metre of water-gas. At the commencement of the gas manufacture the gas is quite free from carbonic acid and steam. In proportion as the glowing layer of fuel cools down the issuing gas contains more and more of both, so that at the end of the cold blast the gases may contain as much as 4 per cent. by weight of undecomposed steam. In working with coarse and pure fuel, such as is employed in America, the hydraulic seal between generator and gasholder would completely suffice, as the air pressure in the ring space can never be very considerable, consequently it can be easily balanced by a small seal in the hydraulic of at most 4 inches, so that air can never enter the scrubber or the gasholder and so generate an explosive mixture. In Germany they work with a deeper layer of fuel of a smaller quality, which is not so pervious to the air blast as anthracite cobbles, so that a higher pressure of air is necessary. Now, in order to render such an eventuality impossible such as has been before mentioned, and in a like manner to prevent gas entering into the air channels during gas-making when the blast is at a standstill, and also the formation there of explosive mixtures, a damper of peculiar pattern is employed. As, however, such a valve or damper will not always keep absolutely gas-tight, the air, if it ever had a greater pressure than the counter pressure of the holder, would, if any leakage occurred, enter during the warm blast. In order to render this impossible, channels are formed on the surface of the damper or otherwise communicating with the outer air; it will thus be clearly seen that even with a leaky valve no air can enter into the gas channel or into the scrubber. It now becomes clear that the air ventilator, the gas ventilator, chimney damper, and steam supply must be opened and closed in a fixed sequence. In order in this respect to be independent of the attention of the workman, all these portions of the apparatus are connected with a common axle

which, when worked by a kind of steering wheel and turned to the left or right, opens all the dampers and ventilators in correct sequence. By this means the very furnace is made into a machine, and in Messrs. Schultz' works this apparatus has kept in good order during the space of over three years. The furnace produces from 250 to 300 cubic metres of water-gas per hour, for a hot blast of ten minutes and a gas-making time of five, the water-gas so produced having the following composition by volume :—

Hydrogen	50·0
Carbonic oxide	41·0
Nitrogen	5·0
Carbonic acid	4·0
	100·0

A strange scientific fact may here be recorded, although not of any practical importance.

(To be continued.)

THE TWENTY-THIRD ALKALI ACT REPORT.

VII.—SULPHURIC ACID WORKS.

The processes existing in sulphuric acid works are by no means perfect yet. It is surprising how little chemical engineering there is in some factories, the owners of which evidently not understanding the principles involved in the operations they have undertaken to exploit. As a rule too much is left to an ordinary foreman, who, more often than not, possesses not one jot of chemical information, his *forte* principally consisting in so brow-beating the chemist as to make him confine himself to the laboratory, so that any of his shortcomings may not be so easily detected. We have one instance in our mind's eye of a works in which we were called in to advise. There the most elaborate statements of quantity and strength of drips were daily recorded, yet things went wrong, and we discovered that the hydrometers were firmly fixed in the drip cups with a deposit of sulphate of lead reaching almost to the overflow of the cups, so that it was impossible to obtain figures at all as to density, and that the numbers entered into the vitriol books must have been evolved from the foreman's inner consciousness.

In ordinary vitriol works a nuisance may arise in several ways. First, from leaky apparatus; second, from escapes during the "potting" with nitre; and thirdly, from the pyrites burners when the kilns are being charged. In concentrating the acid in open pans, there is also the escape of acid vapour to be considered, a source of nuisance often recorded in former reports of the Chief Inspector of Alkali Works. Alkali works as a rule conduct their vitriol manufacture with great care, a point borne out by the reports of the district inspectors now before us, but there is frequent mention of low level escapes from the pyrites burners owing to insufficient draught. This is a circumstance which should not happen, and only occurs through insufficient area of flues and gas passages, the plant, in fact, not having been constructed on any scientific principle. Follow-my-leader is a game frequently indulged in by manufacturers, and because John Smith has a tower or flue of such and such dimensions, Robert Brown must have them similar, notwithstanding some variation in the processes.

One high escape, viz., of ten grains of SO_3 per cubic feet, is reported from works 405, and if this be the only one in the year the owner is to be congratulated. Dr. Affleck seems not to have been so fortunate. We have always held that the inspectors are overworked, and that they spend more time in travelling than they do in inspecting. Dr. Affleck is perhaps the exception, as his district is of very limited area, and he is able to visit his works oftener than is the rule elsewhere. The result of his visits is that no less than twelve infractions of the Act were found, one as high as nineteen grains, and no doubt a similar result would follow from more frequent inspections of the other districts. Vitriol chambers are exceedingly liable to sudden outbursts of gas, especially during the early hours of the week.

Mr. Carpenter reports no fewer than nineteen infr of the Act during 1886 as compared with sixteen in 18 he further remarks that the "disorganisation of worki so prolonged as to require strong representations to b as to the responsibility incurred." Why was no pros instituted in such a case?

Mr. Jackson corroborates our previous statements re the rule-of-thumb manner in which some works are on. He says "there are still nine works where no exit gases are taken." Surely in these days of chemis "require no remuneration" it would not be an ex matter to have the escaping gases tested regularly.

Mr. Curphey reports from Scotland that "in one in owing to a gale of wind springing up while the ch were being started, some damage was done to a g crop by the 'blow-back' of sulphurous fumes fr burners." These are accidents which are very li happen, and we know that it was always a vexed q with the late Dr. Angus Smith—How many *accidents* tute an offence under the Act. We say one, as the etc. Works Regulation Act is very clear and defini what shall not be done. If this is not just, then let be modified.

(To be continued.)

CHEMICAL EXHIBITS AT THE MANCHES EXHIBITION.

XII.—MESSRS. SADLER AND CO.'S EXHIBIT.

At the outset we had not intended to go to such a in the description of individual exhibits as we have do we had almost made up our mind that enough had be of artificial alizarine; but Messrs. Sadler and Middlesbrough, having furnished us with a num practical recipes best suited to their particular alizar feel we should not be doing our duty to our subscri dyeworks—especially wool dyers—by withholding the describe Messrs. Sadler's exhibit properly is no eas owing to the varied nature of the articles they have ex substances made in one or other of the several works o they are the owners. In Germany, many of the anili factories manufacture almost all the chemicals they re oil of vitriol, fuming sulphuric acid, soda-ash, caust muriatic acid, etc.; but we believe that in this coun rule is to purchase these intermediate materials fro makers. There was never a rule without its excepti in this case we are pleased to say that Messrs. Sadler manufacture their own intermediate products, and so the operations under their immediate control. The w Carlton, Stockton-on-Tees, Ulverstone, and Port each contribute tar products, which are sent as soon as factured to the head centre at Middlesbrough for work into the brilliant aniline colours or the more solid an alizarine. But not only colours form a speciality of th they are manufacturers of oxalic acid from sawdust, extremely interesting from a scientific point of view, show their ability in dealing with manufacturing ques may be stated that waste products with them hav reduced to a minimum, even the waste acid which others practically give away have been turned to accou used by them in the manufacture of manures, of whic send out large quantities.

It is the colour industry, however, we have to n this article, and we hope to show that Messrs. Sad Co. are in this wise quite as forward as are the manufacturers in the special dyes they produce. The facture of the aniline colours has already been com upon, and therefore it is not necessary to go over this again, except it be to refer to the sample of Bismarck made from dinitrobenzol by a patented process o interest, and followed, we believe, by no other firm o manufacturers.

But the special purport of this article is to give pro to the use of alizarine colours as specialities for wool and we hope that with the aid of practical hints furni Col. Sadler, this chapter may be found of special int

subscribers in Yorkshire. At the same time we oes not redound to the credit of English dyers the Continent and in America artificial alizarine being increasingly used on wool with the best is country it is as yet employed to but a limited

Now having regard to the great variety of h can be provided by different mordants with extraordinary fastness to milling, soaps, light, nd the evenness, solidity, and the beauty of its ıay be seen even by the most casual observer in of Messrs. Sadler and Co.—together with the simplicity of its application, it is most remark- as not yet come into greater favour with wool enormous quantities of artificial alizarine con- Turkey-red dyeworks and by the calico printers, tiful and permanent effects produced by them, ıave thought would have proved a sufficient cause its more general use on wool. Alizarine such a low price that dyers need not now se it on the score of cost. It is also so handy, linary care, so easy to dye with, that the follow- which have been worked out in Messrs. Sadler eing laboratories at their alizarine and aniline ddlesbrough, will no doubt, not only interest ıable them at once to adopt alizarine, and keep eign competitors.

ller and Co. have made a speciality of alizarines ng, their various brands being suitable mixtures urine, flavopurpurine, and alizarine best adapted named. Dyers who have not obtained satis- s will probably find the cause of failure arose cting the exact quality required, as it must not hat the term alizarine is commercially used for ıvopurpurine as well as alizarine.

the wool must first be well scoured, and after- ghly washed in clean water. *Metal vessels* must t be used, as the dye-bath is always acid; *wood* *ead pipes* are most suitable for the dyeing. It is the *lead steam coil* rather than allow the steam into the bath.

be taken that the water in which the wool is l should be free from lime; this can be easily ıg one ounce of oxalic acid to every 150 gallons each degree of hardness. The alizarine in all r cent. paste, and it is important that *neutral* iably used in scouring.

ing recipes are in each case the proper propor- lb. wool.

Orange Scarlet.

lb. 4 oz. tin-salt and 1½ lb. oxalic acid together add to a dye-bath containing 15 lb. alizarine ds, raise to the boil, boil for half an hour, wash vater, and soap in a fresh bath containing 5 lb. warm, then wash and dry.

Cerise.

oods for one hour in a bath containing 30 lb. drain, then enter into a bath containing 15 lb. and wring, and dye in a bath containing 22 lb. boil for half an hour or so, then wash, soap, . 1.

ting 2B for 4B in above recipe, a medium red obtained.

Claret.

ıe hour with 15 lb. sulphate of zinc, lift and ye with 17 lb. alizarine S2, enter cold and raise ı boiling add to the dye-bath 15 lb. acetate of ɔiling, wash, soap, etc.

Dark Maroon.

a bath containing 4½ lb. oxalic acid and 18 lb. and wring, and dye in a bath containing 22½ lb. nter cold and gradually raise to the boil; when 5 lb. acetate of lime, and finish as above.

shade maroon can be got by substituting acetate ve recipe.

Plum.

Mordant in a bath containing 15 lb. copperas and 2 lb. sulphuric acid, and then enter in a bath containing 17 lb. alizarine S1, and 6 lb. oxalic acid, gradually raise to the boil, and then add 10 lb acetate of lime; wash, soap, etc.

Chocolate.

Dissolve 4½ lb. bichromate of potash or soda; add 14½ lb. sulphuric acid, and 17 lb. alizarine, S1 or S2. Enter goods cold and gradually raise to the boil, then add 15 lb. acetate of lime, boil half an hour or so, then wash, soap, etc.

Drab.

The goods are dyed in a bath containing 3 lb. chrome alum, and 1 lb. alizarine, S1. Enter cold, raise to the boil, boil from a quarter to half an hour, then wash, soap, etc.

Grey.

Mordant for one hour with 3 lb. copperas, and 2 lb. oil of vitriol. Enter into a cold dye-bath containing 1¼ lb. oxalic acid, and 1¼ lb. alizarine, B1. Gradually raise to the boil, and continue to boil until required shade is developed; wash, soap, etc.

Orange Brown.

Mix in one bath 7½ lb. alum, 1½ lb. tin salt, 9 lb. alizarine, S1, and 1½ lb. oil of vitriol. Enter cold and gradually raise to the boil, boil from a quarter to half an hour; wash, soap, etc.

Brown.

Mix in one bath 6 lb. copperas, 3 lb. tartar emetic or oxalate of antimony, 3 lb. oxalic acid, 15 lb. fustic extract, and 3 lb. alizarine, S1. Boil one hour; wash, soap, etc.

Dark Brown.

Same as brown, but with 9 lb. fustic extract, and 6 lb. alizarine, B4.

Olive Brown.

Dye-bath same as brown, but with 22 lb. fustic extract.

A deep shade olive brown can be produced by using 4½ lb. alizarine, 4B.

Maroon Black.

Mordant for one hour in 15 lb. copperas, and 4½ lb. oxalic acid, wash out, and dye in a bath containing 30 lb. alizarine, 4B. Boil for one hour; wash, soap, etc.

Blue-Black.

Mordant for one hour in 15 lb. copperas, and 4½ lb. oxalic acid; wash out, and dye in a bath containing 22½ lb. alizarine, 4B, and 7½ lb. logwood extract.

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

(Continued from page 123.)

In our last chapter on this subject we had arrived at the stage of settled mud, which when dissolved in muriatic acid evolved chlorine, producing chloride of manganese solution for working over again. All hydrochloric acid forming chlorides is absolutely wasted in this process, as the soluble manganese being precipitated by lime soluble chloride of calcium is produced, which finds its way into the nearest watercourse.

To give an idea of the magnitude of the operations incurred in the manufacture of bleaching powder and chlorate of potash, that is to say in the first instance of chlorine, the following statistics of a works making 50 tons of bleaching powder per week may not be uninteresting to our readers, showing as it does what actually becomes of all the hydrochloric acid evolved from the salt. These statistics were very carefully collected over a period of eight weeks. During this time 632 stills were worked off, each delivering 50 cubic feet of still liquor, making a total of 316,000 cubic feet. The free acid in the still liquor amounted to 13·15 oz. real H Cl per cubic foot, and the suspended $Mn\,O_2$ was 1·16 oz. per cubic foot.

The number of batches of regenerated mud blown was 195, containing 215 tons real $Mn\,O_2$ having a base of 0·77, which would be equal to 136 tons of Mn O. During this time the

average chimney escape was 1·6 per cent. The weight of salt-cake made during the same period was 1,227 tons of 95 per cent. quality. In collecting these statistics every care was taken to be correct in stocktaking, and the taking of samples, and the tests were all very carefully executed.

	Tons.	
Real H Cl evolved during the formation of 1,227 tons of 95 °/₀ salt-cake		596
Escaping by chimney		10
Acid actually entering into process		586
	Tons.	
Free acid in still liquors	111	
Acid required for 206 tons $Mn\ O_2$	345	
Acid required for base	139	
		595
Error 9 tons or 1·5 per cent.		

Four hundred tons of 36 °/₀ bleach would contain 144 tons of chlorine, so that to procure this amount by means of Weldon's process, no less a quantity of muriatic acid than 442 tons has to be wasted, or 75 per cent. of that condensed.

And, moreover, there is the loss of manganese which is continually taking place, which amounts in most works to about 5 per cent. of the total amount of bleaching powder made. An inspection of the foregoing figures will show that 9 tons of pure $Mn\ O_2$, or nearly 13 tons of 70 °/₀ manganese was lost in the waste still liquors as suspended and unacted upon peroxide of manganese, this amounts to 3·25 per cent. on the bleach made; then again, there was the loss of soluble manganese which went away in the washed mud, settling from the neutralised liquor tanks. These losses may have been much reduced since the dates on which the experiments were made and the statistics collected, but any how they hold good for that time, and if much lower now the figures show that such saving has not so much value as when manganese was high in price, the difference between 3·25 per cent. and 2 25 per cent. representing in cash only sixpence per ton of bleach, or roughly, every 1 per centum of manganese lost, represents a money value of sixpence per ton of bleach.

The point requiring most consideration is the conservation of acid. We have already seen that no less than 139 tons of H Cl went during a period of eight weeks to neutralise the "base" of the mud without producing a particle of chlorine, so that the chief aim of the chlorine manufacturer should be to produce a still liquor containing but little free acid, and to manufacture a mud possessing a minimum of basic substances.

The importance of the foregoing remarks may easily be illustrated. In a works producing 50 tons per week of bleaching powder, the reduction of the base from 0·82 to 0·55 would mean a saving of no less than 4½ tons of lime per week, and an additional production per week of about 2½ tons of bleach; but *cæteris paribus*, the economy would really be far greater than that due merely to less lime required to produce a low base mud, as a low base mud is invariably denser than a mud with a high base, and hence there is a very large additional saving not only of acid but of limestone. Moreover dense mud gives strong liquors, and the stronger the liquors up to a certain point, the greater the economy at all points alike of labour, coal, and plant.

There are of coure exceptions to every rule, and the following example of a batch which settled as well as any we have ever seen, producing as it did a six-pound mud, may not be uninteresting :—

	Grms. per litre.	*Equivalents.*
Total manganese as $Mn\ O_2$	37·193	·4263
Actual $Mn\ O_2$	26·752	·3075
Protoxide of manganese	8·521	·1200
Lime	8·960	·1600

then $\frac{\cdot 12 + \cdot 16}{\cdot 3075} = 0{\cdot}91$ "base"

and $\frac{\cdot 3075 + \cdot 12 + \cdot 16}{\cdot 4263} = 1{\cdot}38$ total lime used.

In our next article we shall pass in review some of processes which have aimed at depriving the mud of its " before entering the chlorine making process.

(To be continued.)

SHIPMENT OF DANGEROUS GOODS.

IMPORTANT TO SHIPOWNERS.

At the Liverpool Police Court on Wednesday, th inst., Messrs. Wilson, Son, and Co., agents for the Steamship Company, were summoned by the Mersey and Harbour Board for causing a case containing bottles of pentachloride of phosphorus to be taken in Nelson Dock, Liverpool, on the 26th ult. without labelled. It appeared that a police-constable noticed coming from a case lying at the dock. He broke it and poured water into it. When the smoke cease examined the contents of the box, and found five bottles and one broken bottle. The lid of the bo charred, and the straw partially burnt. A sample of p contained in the broken bottle was examined by M Davies, public analyst, who certified that the substanc chloride of phosphorus, and was made by the acti chlorine on phosphorus. It was not inflammable, water was poured upon it hydrochloric acid fumes wo given off, which would char wood, and would have effect on iron and brass. The defendants admitted th notice had been given to the dock-master, but they ha knowledge whatever of the real contents of the bottles. case was shipped at Cork, and the contents described as There was a notice at the back of the shipping note, s that no dangerous substance would be taken by the comp boats. The company could not protect itself if shippers to them and shipped as an innocent substance goods were really dangerous. It was argued that the Act contemplated that shipowners should be responsible in a case, and it was contended that the person who ou be prosecuted was the shipper in Cork. The prose said that the agents were the only people they could g and provision was made in the Act for innocent part recover from the guilty ones. The bench fined the defen 20s. and costs on one information, and 1s. and costs second information, but granted a case for a higher cou it was a case of importance to every shipowner.

Correspondence.

THE CAPACITY OF CARBOYS.

To the Editor of the Chemical Trade Journal.

Sir,—I am afraid your correspondent P. H., who writ page 125 of your issue of September 10th, has got int hands. It is very well known in the trade that ther large and small carboys, and some dealers are note keeping *within* the mark. As a rule, however, there is little to complain of as the following weighings of a de will show :—

Weight of acid.	° Tw.	Gallons.
115	30	10·0
116	30	10·0
111	30	9·6
118	30	10·2
118	30	10·2
117	30	10·1
118	30	10·2
112	30	9·7
112	30	9·7
118	30	10·2

Which makes an average of 9·99 gallons per ca

I am, etc., A Bu

Oil Works Burned.—The Maverick Oil Works at Boston, Massachusetts, has been burnt down, and five have lost their lives.

SPECIAL NOTICE.

The favour already accorded to **The Chemical Trade Journal** is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, **the Organ** of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

DAVIS & CO.,

CHEMICAL TRADE JOURNAL OFFICE,

42, JOHN DALTON STREET, MANCHESTER.

Also that communications relating to the Editorial or Business Departments of the Journal be endorsed "Editor" or "Manager," as the case may be.

As an **advertising medium** *The Chemical Trade Journal* occupies quite a unique position, it being the **only weekly Journal** exclusively devoted to the commercial aspect of chemistry and cognate industries. The Journal circulates amongst

Chemical Manufacturers.
Aniline Dye Manufacturers.
Dyers.
Calico Printers.
Bleachers.
Finishers.
Paper Makers.
Hat Manufacturers.
Oil and Tallow Refiners.
Tar Distillers,
Paint and Varnish Manufacturers.
Soap Makers.
Gas Engineers.
Sellers of Residual Products.
Colliery Proprietors.
Brewers.
Distillers.
Sugar and Starch Manufacturers.
Drysalters.
Alkali Manufacturers.
Chemical Merchants, Brokers, & Agents.
Brick and Tile Makers.
Glass Manufacturers.
Chemical Engineers.
Manufacturers of Chemical Plant and Appliances.
Metallurgists.
Manure Manufacturers.
Makers of Fine Chemicals.
Analytical Chemists, &c., &c., &c.

It will thus be seen that *The Chemical Trade Journal* offers unusual facilities for bringing trade announcements under the notice of a large and important class of buyers, and when it is added that the tariff for advertisements is not an expensive one, the advantages of this department of the Journal will be apparent to all those who seek to extend their business by that indispensable aid to nineteenth century enterprise and success, viz., ***judicious advertising.***

Our Book Shelf.

Coal Tar and Ammonia. By George Lunge, Ph.D., Professor of Technical Chemistry in the Federal Polytechnic School, Zurich. 739 pp., and 191 engravings. London: Gurney and Jackson, Paternoster Row.

At one of the meetings of the local sections of the Society of Chemical Industry, Mr. Ludwig Mond argued that real technology must be learnt in the works itself, as all text books were of necessity at least ten years old. Having had much experience in what the world knows of such matters, that statement always seemed to us doubtful, but the direct denial is now given by the appearance of Dr. Lunge's book, which shows that text books can be issued that are not ten years behind the manufacturer, but in very many cases actually in advance of him.

Whatever Dr. Lunge takes in hand, in the way of industrial chemistry at least, is sure to be done well, and therefore it would be quite out of place to sing praises of the volume now before us, as it will serve our readers better to glance over its pages, and to point out the salient features of this, the second edition, and to put on record for Dr. Lunge's further consideration our remarks upon certain information and data he has published, so that a third edition may be even more correct than the second, if indeed that be possible.

This edition is a considerable improvement upon the first, especially within the first hundred pages, where the merits of the various systems of coking coal are described, and in many instances illustrations of the various ovens are given. Dr. Lunge draws particular attention to the different qualities of tar obtained by the various processes, a point not yet grasped in England by the cokers of coal. The oil produced in open beehive ovens, Dr. Lunge says, "differs from gas retort tar, and it is questionable whether its collection pays for the expense of it." In this matter we certainly agree with him, as ordinary crude shale oil is low enough in price, in all conscience, yet it is an infinitely superior article to coke-oven oil. We have ourselves distilled these oils, refined them with acid and alkali, extracted the paraffin and pitch from them, regained the phenoloid bodies, but we found them all of but little use when we had done so.

Further on (at page 168) the use of tar as a fuel is treated on, and here we think much more might have been added. No mention is made of Mr. George Anderson's tar fireplace used with so much success in this country where tar has been burned as fuel, and far too much prominence has been given to Mr. L. T. Wright's abortive attempts to use tar for heating retorts and firing steam boilers. We do not consider Mr. Wright's experiments to have any practical value whatever, and we should classify them with some others of which we have heard, in which the experimenter made 100 lb. of tar do the same work as 80 lb. of coke. It is easy enough to burn tar badly, but not so to do it well; and we do not consider it at all creditable to the experimenter who can only make a gallon of tar do the same work as 11·4 lb. of coke.

Dr. Lunge treats the subject of the distillation of tar at great length, and gives minute directions respecting the whole of the processes, much new matter having been added to this chapter.

In a further chapter upon the various employments for creosote oil, a description of the light well adapted for open spaces, large workshops, etc., and known by the various names of "Luminator," "Lucigen," and "The new light," is given. We have been surprised that tar distillers generally have not taken up this user of creosote more energetically, but Dr. Lunge will, by means of his book, have made it sufficiently well known. We have seen them in use in various places, and in every way they may be reckoned successful. The chapter on crude carbolic acid we pass by for the present, as we have an article in preparation upon the subject, and we notice we vary in our opinions from some of Dr. Lunge's statements. The rectification of light oil and crude naphtha occupies no less than 83 pages of the work, and will be found a reliable handbook for those who are

engaged in this business. Naphthaline and anthracene are also well treated.

We must join issue with the author again on what we read at page 256, where some experiments made by the writer are contrasted with others made by Mr. Lewis T. Wright. Dr. Lunge seems not to have noticed that Mr. Wright packed his retort with caustic lime, and, therefore, the experiments were not parallel. Mr. Wright had residual works to keep going, and it would not have been policy on his part to have closed them, and to have told his Gas Committee he could do better by either burning his tar or converting it into gas.

To show the reliability of estimates, we quote from page 14, where Levinstein imagines the production of benzol from tar to be nearly 3 million gallons yearly; while on page 266 Mr. Wilton, the manager of the Beckton tarworks, gives the quantity as 1½ million gallons. No doubt Mr. Wilton is much nearer the mark than Levinstein, who had no special means at hand wherewith to guarantee accurate figures.

The last portion of the book is devoted to the manufacture of ammonia and its salts, and as we open it at pages 613 and 614 there is a statement which, if true, does not redound much to the credit of the inspectors under the Alkali, etc. Works Regulation Act. It is that while they are hauling *small* makers up in the provinces for not using the best practicable means, large makers are allowed to go scot free. We will not mention names, but he who runs may read.

Want of space compels us to close this notice. We feel that the necessarily limited account we have been able to give scarcely does the author justice, but when we strongly recommend every gas maker, every tar distiller, and every maker of oven coke to purchase a copy, and to keep it handy as a work of reference, we are sure that in adopting our advice they will never regret the money spent upon it.

ON THE PRESENT POSITION OF THE ALKALI MANUFACTURE.*

(Continued from page 127.)

Now, at length, after prolonged application on the part of Mr. Weldon, the manufacturers opened their doors to an inventor. But he did not come alone, for with him advanced Mr. Deacon, proposing an alternative chlorine process, one on quite different lines. This was about the year 1870. The manufacturers were much perplexed; the old chlorine process was obviously condemned, but to which of the rivals should they yield? For the space of two years it was an undecided question. The demand for bleaching powder increased and the price advanced, till in 1872 it reached £18 a ton. Some solved the difficulty by adopting both.

The doors which had been so long closed against inventors now at length opened; were opened so effectually that they have never since been shut. Detail after detail of the Leblanc process has been improved until the cost of ash and that of bleaching powder have been reduced to one-half of what they were in 1861.

Great advance has been made by the introduction of machinery in the works. One is inclined to smile on noticing in the report of 1861 the mention of a mechanical contrivance for filling casks with soda-ash, as if that were the great achievement of the day, an advance with which for a time they might rest content. Times have greatly altered since then, bringing fresh conditions and altering the stage of action. The increasing trade and advancing prices brought in fresh capital, the old works were largely increased, new ones were started, labour became scarce, workmen could exact unusual terms from the masters, and when it suited them, could abstain for a time from working altogether. A desire was felt for mechanical furnaces, and attempts to introduce a revolving cylindrical black-ash furnace were watched with great interest by the trade. This furnace had been originally suggested by Ellison and Russell, and patented in 1853. It was tried in St. Helens, but was not then made to work successfully. Subsequently the invention was taken up by Messrs. Stevenson and Williamson at Jarrow, and made to yield good results. Seeing this, Mr. Duffy set up a revolver at the Sutton Alkali Works, St. Helens, in 1867, and made it a complete success, thus bringing back to St. Helens the apparatus originally tried there. The furnace has now been adopted by nearly all soda manufacturers. Those more recently erected are much larger than the apparatus first used. One lately built for the Widnes Alkali Company has a cylinder measuring 30 feet in length and 12 feet 6 inches in diameter; the inside dimensions being 28 feet 6 inches, and 11 feet 4 inches. The amount of salt-cake in each charge is 8 tons 12 cwt. About 60 tons is worked through in twenty-four hours.

The mechanical black-ash furnace was soon followed by a mechanical white-ash or finishing furnace. One of these was introduced by Mr. Schofield, and one by Mr. McTear. In these the circular horizontal bed is made to revolve so that each portion of the charge is presented to the action of the flame and heated air of a furnace placed on one side of it. The ash is moved and the lumps broken by revolving stirrers working in that part of the furnace the most removed from the fire.

Stimulated by the success achieved in the mechanical black-ash and the finishing furnaces, attempts were not wanting to construct a mechanical salt-cake furnace in which the heavy manual toil of the old furnace should be dispensed with. In 1875, Messrs. Jones and Walsh, of Middlesbrough, patented a furnace in which revolving arms stirred the hot salt-cake on the flat circular bed. This was an open furnace, the smoke from which mixed with the hydrochloric acid of the charge, and played unrestrained on the iron arms and stirrers.

In order to avoid this source of weakness, Mr. McTear devised his mechanical salt-cake furnace, in which the circular bed of the furnace revolves, bringing each portion under the influence of the flame passing over it; while the stirrers, as in his finishing or white ash furnace, are protected from its fiercest impact. This furnace differs also from others in that the salt and acid are fed in continuously at the centre and work out towards the circumference of the bed, whence the salt-cake is discharged into trollies. By this arrangement, the necessity for opening doors to charge and discharge the furnace being avoided, the danger of escape of acid vapour was prevented. The revolving cylinder form of furnace with heat applied on the outside was also tried for the production of salt-cake. Messrs. Cammack and Walker patented this form in 1876, but were not able to surmount the difficulties which arose in bringing it to successful work.

More recently, Messrs. Black and Larkin, of Jarrow-on-Tyne, have constructed a closed or muffle salt-cake furnace, in which the charge is stirred by revolving arms. The pot is fixed above the furnace and discharges directly into it.

(To be continued.)

* *A paper read by Mr. A. E. Fletcher before the Chemical Section of the British Association in Manchester, Friday, September 2[illegible]*

Notes and Queries.

Sumac.—What is the substitute for sumac in dyeing, and is sumac gradually going out of use?—Drysalter.

Scientific Trading.—Dr. Campbell Brown has been appointed analyst to the Liverpool Household Stores Association Limited, a circumstance which shows that the directors are anxious to protect their shareholders and customers from being imposed upon.

Free Trade in Belgium.—The Chamber of Commerce of Verviers suggests in its annual report that, in the interests of Commerce and industry, Customs should be entirely abolished, and that in any case import duties on iron, engines, raw material, wool, and cotton yarns, and all sorts of food should be suppressed.

Bristol Duties.—During the month of August duties received at Bristol upon tobacco amounted to £51,200, on British plain spirits to £10,300, rum £4,200, brandy £6,000, [illegible] £2,500; foreign plain spirits £1,900, tea £1,400, the [illegible] Massaccuods £300, and fruit £200, making a total [illegible] lives.

CANDLE CO.—An extraordinary general meeting Patent Candle Company Limited, is convened of October for purpose of declaring a dividend.

NT OF GOLD AND SILVER.—The following is return of the movements in the precious metals in Kingdom during the past month (August), as with the corresponding period of the two previous

MPORTS.		EXPORTS.	
	£1,012,567	1887	£2,114,518
	1,658,188	1886	1,714,825
	1,878,179	1885	2,771,400

TATION TO A WIDNES MANAGER.—On the 6th mployés at the Atlas Chemical Works, Widnes, Mr. John Lord, late manager of the works, who e town to enter upon duties at Parr Chemical Helens, with a token of the esteem in which he y them. The gift took the form of a purse of t £20 having been subscribed by the workmen s.

EXPLOSIVE.—At Liverpool Police Court on the young man named Dickenson, employed by xplosives Company, was charged with having carried 5lb. of dynamite in a passenger train from Liverpool. The dangerous compound was paper and labelled "Knives and forks," and ccidentally left it in the carriage when he quitted The Stipendiary Magistrate imposed a fine of sts.

VERPOOL COLOUR MARKET.—Colours without Dchres: Oxfordshire, £10, £12, £14, and £16; , 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, nd common, 18s.; Irish, 45s.; Devonshire, 40s. to ch, J.C. 55s. to 60s.; M.C., 65s. to 67s. 6d. urkish, cargoes to arrive, 40s. to 50s.; Devonshire, White lead, £17. Red lead, £16. Oxide of . No. 1, £19.; V.M., No. 2, £18. Venetian o. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; L. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra st White, 60s.; good, 40. to 50s. Rouge: Best, lb. jewellers, 1s. per lb. Drop black, 25s. to Paris white, 60s. Emerald green, 10d. per lb. red, 60s. Vermilionette, 10d. per pound.

'EST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

e exception perhaps of bleaching powder, which weakened, the general tone is maintained, and an nt is noticeable in one or two lines. The demand nates (both of potash and of soda) has pulled up is now more vigorous than it has been for three ks past. Caustic soda, white, 70/72° has advanced vn under quickened inquiry, and quotations for s, which are somewhat scarce, have become the ner. Nominally there has been no conspicuous lers' figures for bleaching powder, but the demand le, and it is understood that part of the small ried through has been done at lower prices than en about. Of course, it is always the case that nder nominal quotations will be taken for impor- gs, but at present the call for the article is so greater margin of reduction than usual has been o play. There is little passing for the present in ammonia, and that chiefly in fulfilment of back o that quotations talked of have less than usual . With this exception the produce of the shale dustry is all firm and a shade higher in price, ourse, by the shale labour strike now going on. e are no signs of any approaching compromise, tion complete appears still less likely. General nt are:—Soda crystals, 47s., net Tyne; alum, , less 2½ °/₀ Glasgow; borax, English refined, racic acid, £46, net Glasgow; soda-ash, 48/52°, /₀ Tyne; caustic soda, white, 76°, £9. 5s., 70/72°, , and cream, 60/62°, £6. 5s., less 2½ °/₀ Liver- bonate of soda, 5 cwt. casks, £6, and 1 cwt. casks, £6. 5s. net Tyne; refined alkali, 1⅛d., less 7½ °/₀ Tyne; salt-cake, 23s. 6d.; bleaching powder (nominal), £7. 12s. 6d., Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 °/₀ f.o.b. Glasgow; nitrate of soda, 9s.; chlorate of potash, 6d., less 5 °/₀; sulphate of ammonia (nominal), £12. 5s.; paraffin scale, 1½d. to 2¼d.; 120° wax, semi-refined, 2⅝d. to 2⅞d.; paraffin spirit, 7d.; burning oil, 5d. to 5½d. to Scotch buyers; sulphate of copper, £13. 15s., less 5 °/₀ Liverpool. Clyde imports for the week included 14,000 bags sugar and 823 barrels rosin.

THE TAR PRODUCTS MARKET.

OUR last week's price current showed 90's benzol to have a value of 3s. per gallon, at least we were assured that this price was realised for some small parcels for prompt; but it is now equally certain that some has been sold this week at 2s. 9d. and even less. There is a very great disposition on the part of many tar distillers to believe that benzol is still healthy, but we advise them not to trust too much to such opinions. Carbolic is still in good demand at old prices, and anthracene also; some very large sales having been made by the Paris Gas Company and others, equal, it is said, to 300 tons of pure. Pitch is dull, and no more than 11s. 6d. can be realised at port of shipment.

THE SULPHATE OF AMMONIA MARKET.

THE market continues dull, and £12 f.o.b. Hull is all that can be realised for good grey. Beckton price is £11. 15s., and it is rumoured that London dealers have sold forward for six months at £11. 10s. If this be so a repetition of last year's work may take place, and speculators be compelled to deliver without the ghost of a chance of any profit. There is no reason why prices should drop, especially as very little is offering, and it certainly is not policy to sell forward at low prices into the Spring.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

11900. ARTHUR JOHN SHANNON. For improvements in the extraction of antimony from its ores. Sept. 2.

11906. JAMES BUDD. For improvements in the crystallisation of glass. September 2.

11928. JOSEPH WILSON SWAN. For improvements in apparatus for indicating the presence of fire damp in coal mines or other places. September 2.

11947. GEORGE LISCOE. For an improved method and means of separating the solids from the fluids of sewage matter. September 3.

11963. ALLAN STRUTHERS and WILLIAM REID CRAIG. For a new or improved powder sifting machine for druggists and chemists. September 3.

11974. GEORGE STEWARD HAZLEHURST. For converting sea water into a thirst assuaging drink, and substances employed therefor. September 3.

11976. JOHN IMRAY. For production of azoic colouring matters. September 3.

11981. WILLIAM LEIGH. For improvements in amalgamating apparatus. September 3.

11984. HENRY FRANCIS GREEN. For improvements in and relating to processes and apparatus for producing currents of air, spray, and gas, and for purifying, disinfecting, and chemically treating the same. September 3.

11985. AUGUSTUS GEORGE VERNON HARCOURT. For an improved standard oil lamp for use in photometry. September 3.

11988. JOHN DAWSON and ROBERT HIRSCH. For the manufacture of rosaniline sulpho acid. Sept. 5.

OUR PRICE CURRENT.

Prepared by Higginbottom and Co., 116, Portland Street, Manchester.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

		£	s.	d.
Acids:—				
,, Acetic, 25 °/₀	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6⅞
,, Arsenic	per cwt.	0	12	9
,, Chromic 75 °/₀	per lb.	0	0	4½
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.,	per bottle	0	0	6
,, ,, (cylinder) 30° Tw.	,,	0	2	6
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4⅛
,, Sulphuric (fuming 40 °/₀)	,,	12	0	0
,, ,, (Brimstone 168°)	per ton	4	5	0
,, ,, (Pyrites 168°)	,,	3	10	0
,, ,, (spent oxide 168°)	,,	4	0	0
,, ,, (,, 150°)	,,	2	5	0
,, ,, (Pyrites 150°)	,,	2	0	0
,, Tartaric	per lb.	0	1	6¾
Arsenic, white powdered	per ton	10	12	6
Alum	,,	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3½
,, = 24°	,,	0	0	1⅝
,, Carbonate	,,	0	0	3½
,, Muriate	per ton	22	0	0
,, ,, (sal-ammoniac)	per cwt.	34/- & 32/-		
,, Sulphate (grey), London	per ton	12	0	0
,, ,, (grey), Hull	,,	12	0	0
Aniline Oil	per lb.	0	0	9¾
,, Salt	,,	0	0	8¼
Antimony	per ton	35	0	0
,, (tartar emetic)	per lb.	0	1	0
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	4	0	0
,, Sulphate (native levigated)	,,	3	2	6
Bleaching Powder, 35 °/₀	,,	7	7	6
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	12	15	0
Coal-tar Dyes:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	6
Coal-tar Products:—				
Anthracene, 30 °/₀ f.o.b. London,	per unit per cwt	0	1	3
Benzol, 90 °/₀	,, per gallon	0	2	9
,, 50 °/₀	,, ,,	0	2	5
Carbolic Acid (crystallised 35°)	per lb.	0	1	2
,, (crude 60°)	per gallon	0	3	6
Creosote (ordinary)	,,	0	0	1½
,, (filtered for Lucigen light)	,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	1	3
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston	,,	0	11	6
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	39	15	0
,, Sulphate	,,	13	15	0
,, Oxide (copper scales)	,,	36	10	0
Glue	per cwt.	1	17	6
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	53	0	0
Iron (turnings)	,,	1	13	0
,, Peroxide (blue billy)	,,	0	7	0
,, ,, (bog ochre)	,,	1	13	0
,, ,, (precipitated	,,	3	0	0
,, Sulphate (copperas)	,,	1	2	6
.. Sulphide (antimony slag)	,,	1	0	0
heet) for cash	,,	13	10	0
etate (white)	,,	26	0	0
,, *(brown)*	,,	19	0	0
ate	,,	22	10	0
Lime, Acetate (brown)	per ton	9	17	6
,, ,, (grey)	,,	13	17	6
Magnesium (ribbon and wire)	per oz.	0	2	6
,, Chloride	per ton	2	5	0
,, Carbonate	per cwt.	1	17	6
,, Hydrate	,,	0	10	0
,, Sulphate (Epsom Salts)	per ton	2	10	0
Manganese Sulphate	,,	19	10	0
,, Borate	per cwt.	2	5	0
,, Ore, 70 °/₀	per ton	2	10	0
Methylated Spirit, 60° o.p.	per gallon	0	2	4
Naphtha (Wood), Solvent	,,	0	4	1½
,, ,, Miscible, 60° o.p.	,,	0	5	4½
Oils:—Castor	per cwt.	1	4	6
Cotton-seed	per ton	21	10	0
Linseed	,,	21	0	0
Lubricating, Scotch, 885°—890°	,,	5	17	6
Petroleum, Russian	per gallon	0	0	5½
,, American	,,	0	0	5½
Silver (metal)	per oz.	0	3	8½
,, Nitrate	,,	0	2	8
Starches:—				
Sago	per cwt.	0	8	9
Potato (farina)	,,	0	10	3
Sodium (metal)	per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀	per ton	5	2	6
,, ,, (Caustic Soda-ash) 48 °/₀	,,	4	0	0
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	2	6
,, ,, (Soda Crystals)	,,	2	16	3
,, ,, (Crystal Carbonate)	,,	5	12	6
,, Chlorate	per lb.	0	0	7½
,, Borate (Borax)	per cwt.	1	8	6
,, Bichromate	per lb.	0	0	3½
,, Hydrate (74 °/₀ Caustic Soda)	per ton	8	0	0
,, ,, (70 °/₀ Caustic Soda)	,,	7	7	6
,, ,, (60 °/₀ Caustic Soda, white)	,,	6	7	6
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	6	3
,, Bicarbonate	,,	6	0	0
,, Hyposulphite	,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	8	9
,, Silicate (glass)	per ton	5	10	0
,, ,, (liquid, 100° Tw.)	,,	4	7	6
,, Sulphate (Salt-cake)	,,	1	3	6
,, ,, (Glauber's Salts)	,,	2	2	6
,, Sulphite	,,	5	15	0
Potassium (metal)	per oz.	0	3	10
,, Bichromate	per lb.	0	0	4½
,, Carbonate, 90%	per cwt.	0	18	0
,, Chlorate	per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash)	per ton	22	15	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 °/₀	per ton	9	10	0
,, Muriate, 80 °/₀	,,	9	0	0
Strontium Hydrate, 98 °/₀	,,	7	15	0
Sugar, Beet	per cwt.	0	12	9
,, Cane	,,	0	15	6
Sulphocyanide of Barium	per lb.	0	0	6
,, Ammonium	,,	0	0	9
Sulphur (Flowers)	per ton	9	5	0
,, (Roll Brimstone)	,,	6	0	0
Superphosphate of Lime (28 °/₀)	,,	2	0	0
Tallow	,,	22	10	0
Tin (metal)	,,	102	10	0
,, Crystals	per lb.	0	0	6¾
Zinc (Spelter)	per ton	15	0	0
,, Chloride (solution 96° Tw.)	,,	5	15	0

SATURDAY, SEPTEMBER 24, 1887.

THE EXETER FIRE.

SOME of our readers may perhaps think that such a subject as this is not strictly chemical, and perhaps they are in a sense correct; still, it may not be out of place to put before them a few of our thoughts upon a matter which must be of importance to every person in every town in the United Kingdom who even occasionally visits a place of amusement.

The daily papers are just now teeming with advice upon the subject of "Exit in case of Fire," but that this is the wrong point to begin at will be seen by the intelligent reader at a glance. Fire always produces a panic; the very sound of the word is sufficient to cause most people to lose their heads, and when in such a state are consequently not amenable to reason or to follow mechanically any pre-ordered instructions. Anyone who has casually noticed the length of time taken to empty a theatre, or any other place of amusement, even at ordinary times, will have come to the conclusion that the best arrangements and means of exit, notwithstanding the effect of panic, must in almost every case lead to disaster. In fact, even with an open space like a railway platform, anyone may see what a crush and block is caused by the rapid movement of a few hundred people.

Reasoning from such a standpoint as the foregoing, does it not point to the assumption that simultaneously with providing means for escape in case of fire, should not provision also be made for confining it to where it is most likely to break out; to use the best practicable means to render all inflammable articles non-inflammable, and to reduce the evils resulting from the great heat developed by the burning of such large volumes of illuminating gas. There cannot be many disasters on record where the fire has first broken out in the body of the theatre; in nearly all cases the conflagration has commenced "behind the curtain," so that there is an apology at once for legislation to cause the separation of the stage from the body of the theatre by a metallic curtain, which would in the case of fire, prevent, for a time anyhow, the contact of flames with the audience.

In the second place, is everything done in the best manner to render the inflammable articles uninflammable? We are afraid not, and here is a large field for the enterprise of chemical manufacturers. It was stated at the inquest at Exeter that alum was freely used to render the materials non-inflammable; but if it was used in the case in question, we fear there is not much virtue in it. The molybdates and many other preparations have been used for this purpose, but at present they are too costly to be used generally. Need this be so?

Lastly, is the ventilation of the stage and its approaches sufficiently considered? If so, why do we find the temperature of the "flies" at 180° F., a temperature at which nearly all inflammable materials soon become reduced to a species of tinder, so that if even a spark touches them a fire is kindled which no man can ever put out.

With regard to due ventilation rendered necessary by the enormous consumption of coal-gas, has anyone ever considered the heat which is generated by a "sunlight" of moderate dimensions? To heat an oven containing six retorts, at a gasworks, to nearly whiteness requires a gas consumption of about 960 cubic feet of gas per hour. "Sunlights" are constructed to burn more gas than this, so that the immense amount of heat generated is thus put before our readers in a practical form. The great draught caused by this immense heat immediately under the ventilating tube naturally causes an inrush of air from the stage, as representing the line of least resistance, by reason of its large opening; so that in the case of a fire of any great dimensions, unless the stage be isolated from the body of the theatre, the flames will always drive inwards and produce their usual fatal result.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

XIII.—LAKES, PIGMENTS, PAINTS, AND VARNISHES.

THE exhibits coming under this head have been got together with great care and forethought by the owners. Messrs. Rawlins and Sons of the Brook Works, Rainhill, show some fine specimens of ultramarine and smalts, both in the various stages of manufacture. Ultramarines are also exhibited by Mr. Charles Scheu, of Glasgow—the blue, green, and violet varieties—while side by side are the raw materials used for making them. At Stand 756 Mr. William Pakeman, of Stockport, exhibits a series of pigments for calico printers, paper stainers, paper makers, and paint grinders; and there is also a very good show of quick drying enamel paints.

An exhibit of very great interest may be found at Stand 757, where Mr. Henry Crookes shows several applications of his heat indicating paint. There is no doubt but that this article will in time find many uses, and it only requires a little publicity to be given to it to ensure its adoption. At Stand 758 is to be found a miniature kiosk painted with Freeman's non-poisonous white lead paint, which is said to have been subjected to the action of volatile sulphur fumes. While inspecting it, our fingers itched to give it a trial with sulphuretted hydrogen and to observe its complexion after the ordeal. A very neat case is that of Messrs. Ellam, Jones, and Co. of Derby, who exhibit emery, paints, colours, and varnishes, and oxides of iron. A striking exhibit is made by Messrs. Donald Macpherson and Co., of Knott Mill, Manchester, who show a kiosk to illustrate the use of the Foochow enamels—quick drying enamels not needing stoving—and vases, bricks, and timber enamelled with the same. Messrs. Goadsby and Co., of Manchester, have a very useful case of colours, paints, varnishes, and chemicals, showing the colours used in various industries. A patent zinc white, the "vitrol" bath enamel, and fireproof paint is shown by Messrs. Griffiths, Bros., and Co. at Stand 763; while paints, colours, and varnishes specially suited for maritime use are shown by Messrs. William Taylor and Co., of Liverpool; amongst them may be found anti-fouling paints for ships' bottoms, patent rubber paint, patent zinc paint, fresco and enamel paints, imperial boiled drying oil. etc., etc.

Messrs. John E. Williams and Co., of the Victoria Paint Works, Manchester, have a very good exhibit of non-poisonous metallic oxide paints, in black, white, and colours, and also of quick drying metallic oxide enamels, a class of paint which seems coming very much into use—the vehicle is resin dissolved in light petroleum spirit. Messrs. Thos. Fewster and Son, of Hull, show a very good collection of varnishes, varnish stains, paints, and colours, which may also be said of Messrs. R. R. Minton and Co., of Cheapside, Liverpool. The Sheffield Varnish Co. show a number of the varnishes made at their new factory at Oughtybridge, together with a collection of gums and oils used in the manufacture. They also exhibit panels, stained and varnished, and specimens of their tin and stone bottles to show how they are labelled and capsuled.

The next group as catalogued, viz., that devoted to bleached and coloured fibre, we shall only notice by calling attention to Professor Hummel's series of patterns of calico prints illustrating the various styles in vogue during the past fifty years or more, and to show the progress of the chemistry of calico printing during this period. This series is remarkably complete, and Professor Hummel is to be congratulated on the result of his labours. The remainder of the exhibits do not illustrate anything really novel or which is not known to the veriest tyro in textile matters, and in our opinion the whole group would have been far better left in the hands of a special committee who understood the details of the subjects they were dealing with, than to have included it in the Chemical Section as now constituted. Bleaching, dyeing, and calico printing are the staple trades of the Manchester district and it was hardly likely that our best firms would come forward to play second fiddle to the Chemical Section.

The Chemical Section might just as well have included Engineering in its grasp on the ground that an engine was composed of iron, copper, zinc, and lead, all of which are chemical elements.

Our next article will comprise Groups VI. and VII. of the official catalogue.

(To be continued.)

THE TWENTY-THIRD ALKALI ACT REPORT.

VIII. RECTIFYING SULPHURIC ACID.

In Spon's Encyclopædia of the industrial arts, p. 92, it is stated with regard to sulphuric acid, "As acid of more than 1·750 sp. gr., attacks lead very powerfully, and the boiling point of monohydrated acid is very nearly equivalent to the melting point of lead, the concentration is not carried beyond that point in leaden vessels, but in retorts of platinum or glass."

The foregoing statement is scarcely correct, as at the present day there is at least one works wherein oil of vitriol is not only boiled down to 1·75 sp. gr., but also rectified to 1·84 sp. gr. in one and the same leaden pan. We are not however arguing for a continuance of the system, nor do we stand out for its economical character, we simply state facts. Most of the works rectifying sulphuric acid carry on their operations in glass retorts, which are exceedingly liable to fracture from several causes. In the first place the temperature of the contents varies but little from that of melted lead, and cold blasts of air are very apt to cut the glass round the liquor line as cleanly as if it had been done by a diamond. More dangerous and more nuisable are the breakages caused by rain; in these cases the glass is often broken up, and the fumes escaping prove a source of nuisance to the neighbourhood. But there is a source of nuisance far worse than any of these, which is as follows:—Glasses are usually if not always set in iron pots or iron saucers, and kept from actual contact with the iron by means of sand. If a glass breaks when set in a pot, this latter usually retains the acid, which though hot and fuming, does not cause such a lasting nuisance as when a glass breaks set in a saucer, for in this case the whole of the acid is sent into the fireplace amongst the hot fuel, so that what follows we leave our readers to judge. Far better when the manufacturer can afford it is the rectification in platinum, a fine specimen of such a still being exhibited in the Manchester Royal Jubilee Exhibition. Although the nuisance arising from the breakage of glasses is eliminated by the use of platinum stills, there is still a fume arising from them which it is necessary to condense. The rectification of oil of vitriol from 150° Tw. to 168° Tw. is not a simple distillation of water, it is the distillation of a weak acid, most of which was at one time sent direct into the chimney without any attempt at condensation, except that which condensed as a matter of course in the "trunk" behind the glasses. We have made many examinations of these gases throughout the whole period of a boiling, and have found as much as 8·0 grains of sulphuric acid in a cubic foot of the escaping gases.

Numbers such as the foregoing seem no longer to be the order of the day, the reports of the district inspectors indicate that all rectifiers of vitriol behave themselves very well so far as flue escapes are concerned. But the reports are silent upon the subject of breakages, which we believe alone give rise to complaints. These *accidents* vary very much in various works. We have known a case in which one breakage occurred for every 7 tons of oil of vitriol rectified, while in the best works it appears that not more than one glass is broken for every 60 tons rectified. Of course all other works vary between these figures, and it may be taken for granted that when one of these *accidents* does happen it occasions a veritable nuisance.

Much prominence was given a few years ago to the process of rectifying in cast-iron vessels, but rectifiers as a rule do not seem to have had the knowledge or perseverance to push on with it. The writer rectified and *sold* in 1877 oil of vitriol rectified in cast-iron vessels, and there was no difficulty *experienced in doing so; but when* the rectification in iron was puffed as a process for the elimination of arse opened our eyes in wonder. "Parting" is effected i iron vessels by means of sulphuric acid in smelting wo that no difficulty should arise in concentrating vitri similar metal.

The tests given show an escape of under one grain phuric acid per cubic foot of escaping gases, below may not be possible to go, but it is possible to st annoyance caused by the breakage of glass retorts.

(To be continued.)

CHEMISTS AT THE BRITISH ASSOCIATION,

The following short abstract has been provided request by the secretary of the Chemical Section British Association, Mr. William Thomson, F.R.S, F.C.S., etc.

The third meeting of the British Association whi taken place in Manchester during the last half terminated on Wednesday, the 7th inst. This meeti been unique in several respects. It was the largest has ever taken place, and at no other has such a large of eminent foreign and American men of science bee sent. In the Chemical Section, Mendeléef, was specially conspicuous, with his characteristic Russia tall and broad-shouldered, with long, straight and ca arranged hair, but with intelligent eye and kindly exp of countenance. It was he who immortalised his na pointing out, in perhaps a more forcible manner th countryman Newlands had done before him, that the tary bodies obeyed a periodic law in their atomic weig in their properties, and he predicted that there were links in the chain which were missing; one specially point out—a metal, which ought to have certain weight, specific gravity and properties. Shortly afte the metal Gallium was discovered by the Frenchman, de Boisbaudran, which fulfilled in every way the pre of Mendeléef, and thus proved that a law had been dis which enabled him to predict, and this may be ta proof that the law is a great and fundamental one.

Dr. C. Fahlberg was also present. He may be upon as one of those scientific observers who have purely scientific operation into the arena of an in process. He discovered a derivative from coal-tar, for sweetening properties is 250 times greater tha sugar, and this substance is now being manufact Germany. Amongst the other foreign members Chemical Section may be mentioned Professors Meyer, Ladenburg, Otto Witt, and Lunge.

The Chemical Section was very fortunate in havi Edward Schunck, F.R.S., as its president. Dr. Schu given most of his time to purely scientific research however has resulted in doing much valuable service industries. He has made some most valuable resea connection with colouring matters. He did much determining the precise chemical constitution of the c matter of madder (alizarine), and he may be regarde of the pioneers in the discovery of the method of co the coal-tar derivative anthracene into alizarine, wh now all but entirely eliminated madder and garanci the market. His classical researches on indigo, an on chlorophyl have much enriched our chemical kn of these substances.

On Friday, the 2nd inst., omnibuses were provid the members of the committee of the Chemical Secti veyed by them to the Manchester Exhibition, and previous arrangement the C general public between t afternoon. A pleasant t exhibitors being there t interest to those present crude pieces of apparatu atomic weights of the el by which Dr. Joule d heat, and in the tub

raday in his researches on the liquefaction of gases The anic chemists were much interested in the beautiful display coal-tar products by Messrs. Hardman and Co., and by Mr. n Levinstein, and the British Alizarine Company, and of at general interest was the collection of valuable and rare mical products by Dr. Theodor Schuchardt, who was sent to point out the various most interesting preparations. r. Watson Smith showed his exhibits of colouring matters, d Professor Hummel, of Leeds, exhibited the interesting thod of applying Goppelroeder's electric processes to lico printing and dyeing. Mr. Spence exhibited his endid and massive tube of alum, and explained how he d grown the beautiful and perfect crystals of alum in his e. Dr. Hewitt explained his exhibit (Messrs. Brunner, nd, and Co.) of products from Solvay's ammonia soda ocess, and especially the caustic soda made by the oxide of n process, whilst Mr. E. K. Muspratt showed his various ecimens from the old Leblanc process, and the other pro- cts of his manufacture. Afterwards the chemists dined gether at the exhibition.

On the Tuesday following an omnibus was provided, and ove a party of the Chemical Section to visit the works of ssrs. Lockett, Leake, and Co., when the engraving on llers for calico printing was shown; they afterwards visited e extensive works of Messrs. Langworthy, Bros. and Co., hen the operations of spinning, weaving, bleaching, print- g, dyeing, etc., were inspected. It was intended afterwards visit the paper works of Messrs. Chadwick and Taylor, t the time left was not sufficient.

Next day, Wednesday, a similar party of about forty visited e indiarubber works of Messrs. Broadhurst and Co., which ere of exceptional interest; afterwards the glassworks of essrs. Percival, Vickers, and Co. were visited, which roved also to be exceedingly interesting to the party. The ordial thanks of the party were given to the firms who had o kindly opened their works for inspection.

ELECTRIC LIGHTING.

At the recent meeting of the British Association in Manchester, Professor George Forbes gave an address on electric lighting to a large audience in the Free Trade Hall.

Professor Forbes said that five years ago disastrous speculations in purchasing and licensing patents at exorbitant rates paralysed the financial community with regard to the public supply of electric light, and a panic among gas shareholders in the House of Commons and elsewhere created, by Act of Parliament, obstacles to the new industry. At the same time, crude and impossible schemes for distributing electricity made out by incompetent persons were tried and found wanting. The mistrust then engendered was now wholly unwarranted, and the common-sense of the country must be re-awakened if this nation was to take any lead in the future applications of electricity to industry and the arts. Municipal authorities, capitalists, and members of Parliament seemed to be in ignorance of the completeness of the systems now at the disposal of the electric engineer, and of the enormous experience we had gained by studying what had been done abroad. The different kinds of electric lamps were then described. With regard to the incandescent lamp, the lecturer pointed out that it was healthy and clean, while its safety had been shown by the action of the municipality of Paris, who, after the burning of the Opéra Comique Theatre by gas, ordained that all theatres were to be lighted by the incandescent lamp. Its good qualities were proved by the fact that everyone who had the means furnished his house with this light, and also by the fact that the public were crying out at the action of Parliament in hindering the public supply of electricity by legislation in support of the gas monopoly. The generators of electricity and its distribution was next treated, the fact being pointed out that the great difficulty of an engineering character which was encountered in the early attempts to introduce central-station lighting lay in the enormous cost of the copper conductors required to carry the current. After describing the method of conducting the electricity from the central station to the houses of the users, and the method of measuring the amount sent, Professor Forbes alluded to the progress of central-station lighting. In this country, he said, it had been extremely slow, owing largely to the Electric Lighting Act of 1882. If electricity were put on the same terms as gas, and if the station was on a river bank or any place where coal and water were cheap, people could be well supplied with electric light at the same price as gas, at 3s. per thousand cubic feet, with a fair profit to the undertakers. On the continent of Europe there were numerous central stations, mostly small, some supplying 30,000 lights. In America the progress had been enormous. Arc lights in series were used largely for street lighting and for shops, and central stations for glow lamps had been plentifully started on the parallel, three-wire, and induction systems. Most of the best companies concerned paid good dividends. The total money invested in electric lighting in the United States was estimated this year to amount to £30,000,000. In 1886 there were fifty-eight Edison central stations, supplying 149,900 lamps, besides, 181,463 lamps in isolated plants. The Westinghouse Company had during this year been setting up central stations at the rate of 12,000 lamps per month. It was estimated that in 1885 the Brush Company alone had 96,000 arc lamps in use in the States, the number having doubled in each year from 1881. At present there were probably 300,000 arc lamps in use in that country. The Americans were also getting the start of us in electric railways, tramways, and generally in the applications of electricity to motive power. We once beat the whole world in steam railways. Our pre-eminence in steam had gone far to make this country what it was; so let it be with electricity, for we were now passing into the age of electricity.

MODERN COLOURS IN CALICO PRINTING.

Mr. Charles O'Neill read a paper before the last meeting of the British Association, in which he discussed the extent to which calico printing and the tinctorial arts had been affected by the introduction of modern colours. He said the first of the modern colours was M. Perkin's aniline mauve, which was discovered and applied in the year 1856. It was two or three years afterwards—in April, 1859—that the next modern colour, magenta or fuchsin, made its appearance. The tide rose slowly in 1860 with purples, blues, and violets, and gained every year in force and volume, until the flood had now risen to such a height that one who would like to keep up with it stood astonished and dismayed at its extent, and well-nigh confounded by the prospect before him. Nor was there any signs that we had got to the high-water mark, for month after month chemists and colour manufacturers were patenting new colours or new processes in such numbers that only a specialist of specialists could pretend to follow or appreciate the work that was being done. In the course of an interesting review of the progress which had been made in the invention of printing colours of late years, Mr. O'Neill said that in 1856 the two most important colouring matters were indigo and madder. Neither of these colours could be directly printed on calico. Indigo, in the form of China blue, was printed on it, to be subsequently fixed by a process analogous to dyeing, but it was not an important branch of the indigo styles. All attempts to obtain an extract of madder fit for printing had failed, and it was not until about ten years afterwards that an extract of madder came into the market, and for the first time the printer was enabled to produce by direct application upon the cloth various colours yielded by madder. The madder styles of 1856 were of great excellence, and as produced by the best houses, quite as good or better than pure alizarine styles were now, in that alizarine could not be made to yield as good work as madder did. The present conditions of the trade with regard to price, however, were unfavourable to the highest excellence in that class of prints. He pointed out that if artificial alizarine had not come up there could not have been the extensive productions of many-coloured fast cretonne styles which had been the characteristic of the trade

for several years past. The introduction of these most important and valuable of the modern colours had had the effect of cheapening the price of the best kinds of calico prints. By best he meant those of the most durable colours used for personal wear, and so far it was a boon to the purchaser; but how far it had benefited the calico printers was another question. It would appear that the greater facility of producing possible colours had greatly increased the production. The same works and machinery could with these and other modern colours turn out from 50 to 70 per cent. more printed calico than could have been done in the old madder-dyeing days. Increased production without a corresponding increase in demand had, of course, led to a gradual lowering of prices, until profits were cut down to a very low margin. He thought it might be held that the colour mixing made easy by the introduction of modern colours had much to do with the unremunerative condition of calico printing. Comparing work done thirty-four years ago with that which was produced now, he thought there had been no great change in results as far as regarded the quality of the work. There had been a lessening of the cost of colour and a lessening of the labour of the colour mixer, and undoubtedly some colours now were brighter than then, but there was not much in that. As to fastness of colour, except as regarded reds, there had been no gain, perhaps even a loss. None of the modern colours, except alizarine and its allied blue and orange derivatives, could be said to be fast colours upon cotton in the sense that madder or indigo were fast, but at the same time many of them were fast enough for the purpose to which they were applied. The idea that all new dyes were bad dyes and that in the old times there were no loose colours was not warrantable. The truth was that with the ancient dyes as with the modern there was plenty of loose bad dyeing. If the wholesale condemnations of modern colours were correct, these dyes must have fallen into disuse long ago. Which ever might be the true state of the case with regard to cotton, he considered that the introduction of modern colours in the dyeing of fancy silk and woollen style had been a great advantage.

LIQUID FUEL: ITS ADVANTAGES FOR FIRING STEAM GENERATORS.

BY B. H. THWAITE, C.E., F.C.S.

THE following introductory notes on the origin, distribution, and recent development and cost of natural liquid hydrocarbon will be useful, if only to demonstrate the coming importance of this wonderful gift of nature to man.

The theory of Lesqueraux that the origin of petroleum is the result of the decomposition of organic vegetable matter in the form of marine plants, as distinct from the origin of coal from land vegetation, receives more general acceptance, along with more natural corroborative indications, than does the theory of the eminent chemist and late French Minister of Education, Mons. M. Berthelot, who attributes the formation in an ingenious manner to inorganic chemical agencies.

A remarkable geological feature attending the oil fields is the concurrence of salt deposits in close proximity, and also that the principal oil-bearing strata are composed of sand. Another striking geological feature is that the great oil fields are either at the foot or on the slopes of mountainous ranges; as, for instance, in Europe, the Carpathian and Caucasus mountain ranges; in America, North and South, the Andes, Rocky, and Alleghany ranges. This would serve to show that by terrestrial disturbances a luxuriant submarine surface has been [illegible] and overturned, and chemical and geological agenc[illegible] [illegible]rted the marine vegetation in its solutions of s[illegible] [illegible]uid hydrocarbons. The great American oil [illegible] [illegible] included between latitudes 35 and 40. In [illegible] [illegible]cluded in this area oil has been struck. Br[illegible] [illegible]ld of Pennsylvania and New York, [illegible] Mountain oil field in California. [illegible]a and New York have an area [illegible] his oil field is enclosed in the [illegible]tral America and the West Indies oil has been found at Vera Cruz, Mexico, C[illegible] Trinidad. In South America, under the shades of t[illegible] and Sierra Nevada, are the oil fields of Peru, Ecu[illegible] Venezuela. In Europe, our eyes at once turn to [illegible] oil field of the Aspsheron peninsula of Russia, w[illegible] Marvin has made so famous. This field stretches al[illegible] slopes of the Caucasus for a length of 600 miles. [illegible] wealth of this veritable region of fire is incalculabl[illegible] influence on the destiny of Russia may be of m[illegible] importance to Western civilisation. The second i[illegible] tance of the European oil fields is that of Roumania on the southern and eastern slopes of the C[illegible] mountains. Close adjoining, are the provinces of [illegible] and Moldavia, in both of which there is oil. In [illegible] are the Burmese wells, both inland and on th[illegible] adjoining the coast. Oil has recently been struck i[illegible] that may some day supply the steamers passing th[illegible] Suez Canal. In India (Makum, Beloochistan, P[illegible] the Euphrates Valley), as well as in the far east in [illegible] Japan, oil has been found. The volcanic mo[illegible] regions of Northern Italy are considered by Mr. H. [illegible] a reliable and competent authority, to be connected [illegible] great petroleum zone of varying width, but [illegible] thousands of miles from the north-western extremity [illegible] Britain, diagonally across Europe, the Crimea, the [illegible] across to Persia, extending probably as far as Bur[illegible] 1866 the total number of gallons exported from the [illegible] of the United States equalled 50,987,341. In 1886 [illegible] number was increased to 577,781,752 gallons—a[illegible] equivalent to 900 per cent.

The average price, after a lengthened period of [illegible]able fluctuation, has gradually receded from 89 [illegible] gallon in 1866, down to 2·4 cents per gallon in 1886 [illegible] the specific gravity of the oil to be 0·91, and th[illegible] delivery by one of the five projected pipe lines, free [illegible] at 5 cents per barrel, the cost would thus be abou[illegible] ton. The production of crude petroleum in the [illegible] peninsula (Baku) in 1866 equalled 2,748,304 gal[illegible] 1885 the production had increased to 396,000,00[illegible] and the price had receded from 2½d. in 1866, dow[illegible] of a penny in 1885, or equivalent to 2s. 5d. per t[illegible] export of oil from Batoum has increased, from Jul[illegible] July of this year, by 50,000 tons over that of th[illegible] year. On the completion of the proposed great [illegible] line from the Baku oil wells to the Black Sea c[illegible] assuming a very fair price of 7 copecks to be ch[illegible] pood for transport, the cost of the Baku Russian [illegible] thus be 10s. 11d. per ton. By chartering a tank st[illegible] oil could be delivered free on board at the ports of t[illegible] Kingdom for £1. 10s. a ton. At present the rail[illegible] waggons and storage tanks at Batoum are fully u[illegible] refined petroleum, and there are no convenience[illegible] transport or storage of the crude oil.

The different methods at present devised for eff[illegible] combustion of crude liquid hydrocarbons may be di[illegible] three characteristic categories, *e.g.*:—

1st.—The combustion of the oil *per se* in a [illegible] gutter.

2nd.—The combustion of the oil in spray or [illegible] form by the use of a jet of steam or ai[illegible]

3rd.—The conversion of the oil into absolute [illegible] combustion.

The arrangement invented and recently tested by [illegible] belongs to the third class. The argument advanc[illegible] if the hydrocarbon be in a liquid condition, it is i[illegible] to obtain absolutely complete combustion, exce[illegible] seriously excessive amount of air over that th[illegible] required; and unless the final temperature of the [illegible] gases is very low, this involves a very serious loss [illegible] units. A supply of air, theoretically equivalent, [illegible] either of the systems in class 1 or 2, produces [illegible] deposition of solid carbon, followed by a definite [illegible] many heat units, and an interference with the [illegible] transmission of the heat evolved.

(To be continued.)

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ON THE PRESENT POSITION OF THE ALKALI MANUFACTURE.*

(Continued from page 134.)

Beside the introduction of mechanical salt-cake furnaces, improvements were made in the construction of those wrought by hand—notably those by Messrs. Gamble, Gaskell Deacon and Co., and Mr. Wigg, with the object of diminishing the liability to leakage of hydrochloric acid into the chimney draught.

Thus were mechanical appliances and improve furnaces brought to bear in the manufacture of salt-cake, black-ash, and the final roasting of the finished carbonate; also in other details was the use of machinery introduced, as for breaking pyrites, for hauling and raising materials. Tramways were constructed, not only on the floor of the works, but on a high level, so that material could be conveyed to the exact places where they were wanted, and even shot down through hoppers into the furnaces themselves. In this way has mechanical science done its part in aiding the development of the Leblanc processs, let us see what share chemists have had in the recent progress of that manufacture.

In the report of 1861 it is said that "the Gay-Lussac column is seldom in use, as with nitrate of soda at £12 a ton it does not pay." It did not pay on account of the expense then incurred in concentrating the sulphuric acid required in it as an absorbent of the lower oxides of nitrogen. This had then to be done in evaporating pans by the direct expenditure of fuel. Various attempts were made to alter this; the most successful was by Mr. Glover who designed the concentrating tower now in common use. It is a leaden column filled with flints, down which the weak acid of the sulphuric acid chambers is made to percolate. The hot gases from the pyrites burners pass up the column in their way to the chambers, carrying with it steam and nitrous gases. Mr. Glover's first tower was erected in 1859. With the Glover tower the Gay-Lussac column came into general use. Of late years these have been constructed of greatly increased dimensions. One erected lately at the Weston Works of the Runcorn Soap and Alkali Company is 21 feet in diameter and 70 feet high. Another at the Globe Works, St. Helens, is 20 feet diameter and 60 feet high. Other manufacturers who prefer columns of more moderate dimensions have increased the number of their towers. By this means, the consumption of nitrate of soda has been reduced from 12 or even 15 per cent. (which was the quantity used at the period under comparison with the present), to as little as 2 or 1½ per cent. of the sulphur burnt. It is indeed reported by some that a still lower proportion is reached.

The yield of sulphuric acid from the sulphur burnt now closely approaches the theoretical maximum, owing partly to a more careful watch being kept on the gases leaving the chambers. In some of the works a continuous sample is taken, which is submitted to analysis every day. In the older report referred to, it is said that in the concentration of sulphuric acid the use of glass has replaced that of platinum—this is not now generally the case. In the largest works, platinum is preferred to glass on account of the compactness of the apparatus, and for economy of fuel. In the smaller works, however, the use of glass is common. In a few works an arrangement introduced by Messrs. Chance of Oldbury is adopted, the acid is allowed to flow through a series of glass balloons, one lower than the previous one, the overflow from the lowest being concentrated acid.

In the report of 1861, mention is made of a process carried on at the works of the Patent Alkali Company, St. Helens, for the manufacture of soda by roasting together pyrites and salt, the expected result being hydrochloric acid and chlorine, to be distilled off, leaving a mixture of salt-cake and peroxide of iron, which were to be separated by lixiviation. It must be noted that but imperfect provision was made for the condensation and collection of the hydrochloric acid, much reliance being placed in the efficacy of a high

* A paper read by Mr. A. E. Fletcher before the Chemical Section of the British Association in Manchester, Friday, September 2nd, 1887.

chimney. The process did not pay, and was abandoned, at least as a soda-making process, but for copper recovery a similar one is now carried on largely. Burnt pyrites and salt are ground and roasted together, the copper salts separated by lixiviation. Initiated by Mr. Henderson (patents 1859 and 1860), this process is so largely adopted that now over 12,000 tons of copper are annually recovered by its means. To this was added (patent 1871), a process by Mr. Claudet for extracting the small quantities of silver and gold which accompany the copper. By this means 360,000 ounces of silver and 3,000 ounces of gold are annually recovered from the same source. The total quantity that has been recovered by this process amounts to over 2¾ millions of ounces of silver, and 14,965 ounces of gold.

In the same report mention is made of a process for the recovery of sulphur from the tank waste of the Leblanc process, proposed by Mr. Gossage, but not worked out to a successful issue. Since that time a process proposed by Mr. Mond has been successfully applied, about 3,500 tons of sulphur are yearly recovered by its means.

The manufacture of caustic soda is also mentioned as a new achievement, first carried out by Mr. Dale at Warrington. At present no less than about 154,000 tons are annually produced.

During the last ten years, slight alterations have been proposed in the proportions to be used of the three ingredients forming the charge of the black-ash furnace—the coal, limestone, or chalk, and sulphate of soda—and in the method of throwing them into the furnace. The main process, however, of fusing those materials together and when cold lixiviating the mixture for the extraction of carbonate of soda, is followed almost exactly as was proposed by Leblanc now just a century ago. In the subsequent treatment of the crude soda solution thus obtained, an important modification was introduced by Messrs. Carey, Gaskell and Hurter in 1879. They pass the liquor from the lixiviating tanks through a coil of iron pipe maintained at a temperature of 300° Fah. by which means the ferrocyanide is broken up and iron separated as sulphide. From this purified liquor the monohydrated carbonate of soda separates in small crystals, and is now a form of soda offered in commerce as "crystal carbonate." Soda in this form is also in a convenient condition for the absorption of carbonic acid, and it is most successfully employed in the production the of bicarbonate. By this means bicarbonate of soda can be made direct from the black-ash in twenty four hours, while by the older method a period of about three months must elapse.

Thus far I have given a sketch of the growth and progress of the soda manufacture as carried on by the Leblanc process, for until the year 1877 all the soda of commerce was made by that means. In that year, however, the now well known ammonia soda process forced itself into notice, and has since then reached such large proportions that 17·4 per cent. of the soda now manufactured in this country is produced by that method.

In Germany the amount of soda made by the ammonia soda process is 75 per cent. of the whole. In France it is [illegible] per cent., and in Austria 47 per cent.

By the kindness of Mr. Hasenclever, of Aachen, I am enabled to give the following statistics of the German soda industry. There has been a great development of it since the year 1872, when a change was made in the excise regula- [illegible] which affect the trade. At that time, and for some years [illegible] to about 27,000 tons pure carbonate, [illegible] abroad, this being about 40 per cent. [illegible] in the country. Since that period [illegible] as to stop importation, and [illegible] export. At the same time the [illegible] to eight shillings per [illegible]

[illegible] Alkali works, from [illegible] equivalent to 150,000 [illegible] an output in 1878 of [illegible]

following tabular

IMPORT AND EXPORT OF FOREIGN SODA TO A GERMANY. AMOUNT GIVEN IN TONS.

Year.	Soda-ash.	Caustic.	Crystals.	Bicarbonate.
1872	7,513	1,331	10,977	238
1873	10,104	1,858	12,306	472
1874	15,413	3,751	11,040	404
1875	16,064	5,980	11,381	517
1876	14,412	7,831	13,253	503
1877	14,530	7,915	10,679	510
1878	14,111	9,275	9,219	452
1879	15,911	6,887	10,686	366
1880	6,061	9,373	10,053	263
1881	6,310	5,266	10,833	327
1882	5,598	6,134	7,332	297
1883	887	4,748	2,076	206
1884	*7,318*	1,973	2,037	250
1885	*8,962*	2,299	282	112
1886	*9,150*	676	*1,759*	120

The figures printed in italics indicate exports, the figures imports.

Mr. Hasenclever adds that it is, in his opinion, ir for Germany to carry on permanently an export trad products, since in England all the raw materials industry are cheaper, and the alkali works are bette in relation to the seaports.

(To be continued.)

Notes and Queries.

GUNPOWDER EXPLOSION.—On Tuesday night, inst., an explosion occurred in the amalgamating m Lowood gunpowder works, High Furness, wh undergoing repairs, and had been swept and washe joiners, named Thomas Kirkby and Henry Dixon, work in the building at the time, and were seriously the former dying the next day.

MUNGO MILLS ON FIRE.—Royds Mills, Ossett, b to Messrs. Hanson and Wormald, mungo manu have been destroyed by fire. The damage will a £30,000 or £40,000, which is covered by insurance. 200 operatives will be thrown out of work.

SCOTCH OIL COMPANIES.—The Broxburn Oil C have commenced two benches of their retorts, a expect that other two will be re-started in the co few days.

ST. HELENS GAS.—The report of the gas exar St. Helens was read at the last meeting of the gas c as follows:—Illuminating power 18·29 candles; sul hydrogen absent; carbonic acid absent; sulphur forms than sulphuretted hydrogen, per 100 cubic f grains; ammonia, per 100 cubic feet, 0·68 grai would much like to know how the total sulphur brought so low as 8·17 grains per 100 cubic feet, carbonic acid entirely eliminated. We have seen s of this gas which do not bear out the above figure would be well if these tests were looked into by son St. Helens chemists.

RIVER POLLUTION.—Owing to the fearful polluti Ribble many salmon have been choked in attem ascend the river, and other sea fish poisoned.

LAMPS FOR MINES.—Mr. Matthews stated in th of Commons that he was aware that the electric l very little used in mines, and he should be very glad more generally adopted. He had seen various lamps, including the eclipse lamp, which made him that the problem as to the satisfactory construction o which might meet the practical requirements of the promote the safety of miners would be shortly, if it been already, solved. He should use all the mea power to induce the adoption of a lamp that suite cumstances of the case, and he should rejoice to l the miners' delegates would also use their influen same direction.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

ON the whole the tone has, if anything, slightly improved over the week, although scarcely a fair average yet passing. Bleach for spot business is the turning better, and caustic fully holds what it made ten days ago, also for prompt, but in both of these easier terms are obtainable under forward delivery contracts. Soda crystals gradually get more into stock, and have given way in price to the extent of sixpence. Sulphate of ammonia, after a month of indecision, has made a palpable fall, partly helped thereto by signs that the labour troubles of the mineral oil masters are coming to an end. Indeed, the shale strike may be described as closed, the bulk of the men having recognised the inevitable and resumed work on the masters' terms. Paraffin products made further rises, previously however—(naphtha, for instance, touching 8d. for favourite brands, of course purely a famine figure arising from exhaustion of stock owing to stoppage of manufacture); but with the make creeping back to normal condition the market will probably assume a lower tone, although negotiations are still progressing for the permanent elevation of scale and wax by means of alliance and combination. Bichromates are at least not worse off for orders than a week ago, but despatch is still much below average. General prices current are :—Soda crystals, 46s. 6d. net Tyne ; alum, £4. 17s. 6d., less 2½ °/₀ Glasgow; borax, English refined, £31, and boracic acid, £46, net Glasgow ; soda-ash, 48/52°, 1d., less 10 °/₀ Tyne ; caustic soda, white, 76°, £9. 5s., 70/72°, £7. 12s. 6d., and cream, 60/62°, £6. 5s., less 2½ °/₀ Liverpool ; bicarbonate of soda, 5 cwt. casks, £6, and 1 cwt. casks, £6. 5s., net Tyne ; refined alkali, 1⅛d., less 7½ °/₀ Tyne ; salt-cake, 22s. ; bleaching powder, £7. 12s. 6d. to £7. 15s., less 5 °/₀ f.o.r. Glasgow for prompt ; bichromate of potash, 4½d. and of soda, 3½d., less 5 °/₀ f.o.b. Glasgow ; nitrate of soda, 8s. 9d. to 9s. ; chlorate of potash, 6d., less 5 °/₀ ; sulphate of ammonia, £11. 17s. 6d., f.o.b. Leith ; paraffin scale, hard, 2d., soft, 100°, 1¼d. to 1⅝d., 120° wax, semi-refined, 2¾d. ; paraffin spirit (naphtha), 8d., and paraffin burning oil, 5d. to 5½d. as before ; sulphate of copper, £13. 15s. Week's imports include 48,290 bags sugar, 6,128 bags guano, and 500 barrels wax.

THE TAR PRODUCTS MARKET.

IT was reported on 'Change last Tuesday that the whole of the production of benzol of a large carbonising works had been sold for the year 1888, though the price did not transpire. There is no doubt we shall soon hear the price at which the business has been done, but so far it has been hinted to us that it is much below present quotations.

Benzol, 50/90, has also been sold during the past few days at a low price. A buyer of 24,000 gallons informs us that he paid 2s. 1d. f.o.b. Goole for 3,000 gallons per month.

Anthracene and carbolic acid remain in *statu quo*, while crude naphtha is steadily declining, the price for forward being at least 1½d. per gallon below parcels for immediate delivery. Pitch remains low and is difficult of sale, so that it is not easy to tell what its future will be.

THE SULPHATE OF AMMONIA MARKET.

THE sulphate market is very dull, and although spot parcels have been sold for £11. 17s. 6d. f.o.b. Hull, there is the awkward fact staring us in the face that sulphate has been sold into next year at a price that will only leave the the dealers a little over £11 at Hull. The future of sulphate much depends upon what the speculators requirements are for this month. Is is certain that the large quantity sold early last month at £11. 10s. f.o.b. Hull will have to be delivered, and as things go on matters seem to be drifting into that state which will enable the operators to fulfil their engagements without loss to themselves. We hear Beckton is offering at £11. 12s. 6d., but cannot get any confirmation of actual sales at this *price*.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

12222. RICHARD VINE TUSON. For improvements in the preparation of materials to be used as disinfectants, deodorisers, and antiseptics, as well as for the destruction of parasites infesting man and the lower animals, and similar uses. September 9.

12249. WILLIAM MC.ELROY and HENRY CONNETT. For improvements in machines and apparatus for carbonating liquids. September 9.

12277. ARTHUR JOHN SHANNON. For improvements in the treatment of zinc ores. September 10.

12285. ERNEST BENTZ. For improvements in the manufacture and composition of oil compounds for dyeing and calico printing, and such like purposes. September 10.

12352. THOMAS LESLIE GREGSON BELL. For improvements in means and apparatus for distilling sulphur, applicable also to the distillation of tar, rosin, arsenic, salammoniac, and the like. September 12.

12355. JOHN IMRAY. A communication from La Société Anonyme des Matieres Colorantes et produits Chimiqies de St. Denis, Alcide François Poirrier and Daniel Auguste Rosenthiel. For production of new tetrazoic colouring matters. September 12.

12424. EMIL DANIEL MULLER. For improvements in explosive compounds. September 13.

12458. HENRY BIRD. For treating the residual spent iron liquors resulting from the manufacture of copper from burnt cupreous sulphur ores to obtain a certain oxide of iron therefrom, and apparatus to be used therefor. September 14.

12483. JOHN BENNETT. For a new disinfectant. Sept. 14.

12486. ORLANDO MORTON THOWLESS. For improvements relating to the production of sodium and potassium, and to apparatus therefor. September 14.

12540. ALBERT BERWICK CUNNINGHAM. For improvements in the manufacture of sodium, and apparatus therefor. September 15.

12549. HENRY HARRIS LAKE. A communication from Messrs. Wuth & Co. agents for K. Ohelir Germany. For improvements in the manufacture of colouring matter.

COMPLETE SPECIFICATIONS ACCEPTED.

11889. FARNHAM MAXWELL LYTE. For improvements in the manufacture of pigments. September 18, 1886.

13286. ADOLPH FRANK. For improvements relating to the treatment of the spent lyes used in the manufacture of cellulose by means of sulphites, for the recovery of sulphurous acid therefrom, and to the utilisation of the said lyes after such treatment. Oct. 30, 1886.

13929. HENRY ELLISON and GEORGE EDWARD DAVIS. For a new and improved method for the distillation of coal-tar, the oils from coke-ovens, and other similar fluids. October 30, 1886.

14625. JOHN HENRY JOHNSON. A communication from The Badische Anilin and Soda Fabrik of Germany. For improvements in the preparation of red colouring matters. November 11, 1886.

14673. EUGÈNE HERMITE, EDWARD JAMES PATERSON, and CHARLES FRIEND COOPER. For improvements in apparatus for the preparation of bleaching solutions by electrolysis. November 12, 1886.

15352. WILLIAM BURNS. For improvements in the manufacture of bicarbonate and carbonate of soda by the ammonia process, and in the construction and use of apparatus for that purpose. November 25, 1886.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
ACIDS:—			
,, Acetic, 25 °/₀ ... ... per cwt.	0	10	0
,, ,, Glacial ... ... per lb.	0	0	6⅞
,, Arsenic... ... ... per cwt.	0	12	9
,, Chromic °/₀ ... ... per lb.	0	0	4½
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	6
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	2½
,, Oxalic ... ... ,,	0	0	4⅜
,, Sulphuric (fuming 40 °/₀) ... ... ,,	12	0	0
,, ,, (Brimstone 168°) ... per ton	4	2	6
,, ,, (Pyrites 168°) ... ... ,,	3	5	0
,, ,, (spent oxide 168°) ... ,,	4	0	0
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	1	17	6
,, Tartaric ... ... per lb.	0	1	6¾
Arsenic, white powdered ... ... per ton	10	12	6
Alum... ... ... ,,	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
,, = 24° ... ... ,,	0	0	1¾
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per cwt.	1	2	6
,, ,, (sal-ammoniac) ... ,,	34/- & 32/-		
,, Sulphate (grey), London ... per ton	11	10	0
,, ,, (grey), Hull ... ... ,,	11	10	0
Aniline Oil ... ... per lb.	0	0	10
,, Salt ... ... ,,	0	0	8½
Antimony... ... ... per ton	35	0	0
,, (tartar emetic) ... ... per lb.	0	1	0
Barium Chloride ... ... per ton	7	10	0
,, Carbonate (native) ... ... ,,	4	0	0
,, Sulphate (native levigated) ... ,,	3	2	6
Bleaching Powder, 35 °/₀ ... ... ,,	7	7	6
,, Liquor, 7 °/₀ ... ... ,,	2	12	6
Bisulphide of Carbon ... ... ,,	12	10	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... ,,	0	3	9
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. London, per unit per cwt	0	1	3
Benzol, 90 °/₀ ,, ... per gallon	0	2	8
,, 50 °/₀ ,, ... ,,	0	2	1
Carbolic Acid (crystallised 35°) ... per lb.	0	1	2
,, (crude 60°) ... ... per gallon	0	3	9
Creosote (ordinary)... ... ... ,,	0	0	1½
,, (filtered for Lucigen light) ,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C. ,,	0	1	3
Creosote Oils, 22° Tw. ... ... per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ... ,,	0	11	6
Coke-oven Oils (crude) ... ... per gallon	0	0	1½
,, (distilled) ... ... ,,	0	0	2
Copper (British bars) ... ... per ton	39	10	0
,, Sulphate ... ... ,,	13	10	0
,, Crude (in scales) ... ... ,,	36	10	0
[illegible] ... ... per cwt.	1	17	6
[illegible] ... ... per ton	33	0	0
... ... ,,	53	0	0
... ... ,,	1	13	0
... ... ,,	0	7	0
... ,,	1	13	0
,, ,,	3	0	0
,,	1	2	6
,,	1	0	0
,,	13	5	0
,,	26	5	0
,,	18	15	0
,,	22	10	0

	£	s.	d.
Lime, Acetate (brown) ... ... per ton	9	15	0
,, ,, (grey) ... ... ,,	14	0	0
Magnesium (ribbon and wire) ... ... per oz.	0	2	6
,, Chloride ... . per ton	2	5	0
,, Carbonate .. .. per cwt.	1	17	6
,, Hydrate ... ... ,,	0	10	0
,, Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... . ,,	19	10	0
,, Borate .. .. per cwt.	2	5	0
,, Ore, 70 °/₀ ... ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	4
Naphtha (Wood), Solvent ... ... ,,	0	4	1½
,, ,, Miscible, 60° O.P. ... ,,	0	5	6
OILS:—Castor ... ... per cwt.	1	4	6
Cotton-seed ... ... per ton	21	15	0
Linseed ... ... ,,	21	0	0
Lubricating, Scotch, 885°—890° ... ,,	5	17	6
Petroleum, Russian ... ... per gallon	0	0	5
,, American ... ... ,,	0	0	5⅜
Silver (metal) ... ... per oz.	0	3	8¾
,, Nitrate ... ... ,,	0	2	8
STARCHES:—			
Sago ... ... per cwt.	0	8	9
Potato (farina) ... ... ,,	0	10	3
Sodium (metal) ... ... per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀ per ton	5	2	6
,, ,, (Caustic Soda-ash) 48 °/₀ ,,	4	0	0
,, ,, (Carb. Soda-ash) 48 °/₀ ,,	4	2	6
,, ,, (Soda Crystals) ... ... ,,	2	17	6
,, ,, (Crystal Carbonate) ... ,,	5	12	6
,, Chlorate ... ... per lb.	0	0	7½
,, Borate (Borax) ... ... per cwt.	1	8	6
,, Bichromate... ... ... per lb.	0	0	3½
,, Hydrate (74 °/₀ Caustic Soda)... per ton	8	0	0
,, ,, (70 °/₀ Caustic Soda)... ,,	7	7	6
,, ,, (60 °/₀ Caustic Soda, white) ,,	6	7	6
,, ,, (60 °/₀ Caustic Soda, cream) ,,	6	6	3
,, Bicarbonate ... ... ,,	6	0	0
,, Hyposulphite ... ... ,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool per cwt.	0	8	9
,, Silicate (glass) ... ... per ton	5	10	0
,, ,, (liquid, 100° Tw.)... ... ,,	4	7	6
,, Sulphate (Salt-cake) .. .. ,,	1	3	0
,, ,, (Glauber's Salts) ... ,,	2	2	6
,, Sulphite ... ... ,,	5	12	6
Potassium (metal) ... ... per oz.	0	3	10
,, Bichromate ... ... per lb.	0	0	4½
,, Carbonate, 90% ... ... per cwt.	0	18	9
,, Chlorate ... ... per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ... per ton	22	15	0
,, Nitrate (refined) ... ... per cwt.	1	2	0
,, Prussiate Yellow ... ... per lb.	0	0	7½
,, Sulphate, 90 °/₀ ... ... per ton	9	10	0
,, Muriate, 80 °/₀ ... ... ,,	9	0	0
Strontium Hydrate, 98 °/₀ ... ... ,,	7	15	0
Sugar, Beet ... ... per cwt.	0	12	0
,, Cane ... ... ,,	0	15	6
Sulphocyanide of Barium ... ... per lb.	0	0	6
,, Ammonium ... ... ,,	0	0	9
Sulphur (Flowers) ... ... per ton	9	5	0
,, (Roll Brimstone) ... ... ,,	6	0	0
Superphosphate of Lime (28 °/₀) ... ... ,,	2	0	0
Tallow ... ... ,,	22	10	0
Tin (metal) ... ... ,,	103	0	0
,, Crystals ... ... per lb.	0	0	6⅞
Zinc (Spelter) ... ... per ton	15	5	0
,, Chloride (solution 96° Tw.) ... ... ,,	5	15	0

The Chemical Trade Journal,

SATURDAY, OCTOBER 1, 1887.

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TO OUR READERS.

The increasing demands on our space, both for literary matter and advertisements, have necessitated an early enlargement of The Chemical Trade Journal. We had it in contemplation to increase the size of the Journal on the completion, say, of our first volume, and it is therefore with pardonable pride that we have occasion to announce *our first enlargement* as early as the nineteenth number.

It is our intention to permanently increase the literary portion of the paper by four additional pages, or eight columns of matter. This week the Journal, which has hitherto consisted of sixteen pages of matter and advertisements, is increased by one-half, viz., to twenty-four pages, twelve of them being literary matter.

Perhaps one of the most satisfactory indications of the value of our Journal as a Trade Organ is the increasing use that is being made of its columns by advertisers. As a rule, advertisers do not take kindly to a young Journal, therefore we can only account for the applications for space in our advertisement columns by the fact that its intrinsic merits as a Trade Journal, and the spirited manner in which it is conducted, commend themselves to advertisers.

To both our subscribers and advertising friends we express our acknowledgments for the gratifying reception which The Chemical Trade Journal has met with up to the present. We can only reiterate our determination to spare no effort on our part to maintain and increase the high-class character of the Journal, and make it worthy of the patronage and support of the important industries in whose behalf it was established.

THE ECONOMICAL PRODUCTION OF OXYGEN.

THE PROCESS OF MM. BRIN FRÈRES.

In our previous article on this subject (see *ante* 97) we have shown that by the cheapest method there described, oxygen could not cost less than four shillings per thousand cubic feet, though in practice it would probably be found to cost much more. A process now coming to the front as one capable of cheapening the production of oxygen for industrial purposes is that of two French engineers, the Messrs. Brin, which is now at work in London at Horseferry Road, Westminster. The process there carried out on the large scale is based on the reaction first described we believe by Boussingault in *Ann. Ch. Phys.* (3) xxx. 5, and afterwards appearing in the *Q. J. Chem. Soc.*, v. 269, wherein it was found that air passed over gently heated hydrate of baryta parted with its oxygen forming peroxide of barium, which latter, at a slightly higher temperature, liberates one-half of the oxygen so absorbed in a state of purity.

In the year 1852 Messrs. Swindells and Nicholson obtained letters patent (No. 390, October 14th) for the foregoing process substantially as it was described by Boussingault. Their specification was of a very omnibus character, and later experience shows that the process could never be carried on industrially as it was described by the patentees. That this is so has been proved by the fact that until recently such a process has never become an industrial operation; most if not all of the oxygen supplied in open market having been produced through the medium of the time-honoured process of heating a mixture of chlorate of potash and manganese. But to-day Brin's Oxygen Co. appears to rule the market, and has reduced the trade price of oxygen in London to about twopence per cubic foot. On page 97 we have already shown that the cost price of oxygen by the chlorate of potash method to be £7. 3s. per thousand cubic feet, so that with a selling price of £8. 6s. 8d. there is not much in it, in the way of profit, but even at this price the consumption can be comparatively but limited, the cost being simply prohibitive for most industrial operations on a large scale.

All this seems now on the brink of revolution, the practical difficulties fatal to the successful working of the Boussingault reaction having been overcome by the new process of the Messrs. Brin, opening to the world a cheap and literally unlimited supply of oxygen, which is sure to find many applications.

The line of demarcation between the failure of previous experimenters from Boussingault downwards, and the success of Messrs. Brin, is not a wide one, but is yet most clearly defined. The vital principle of their process may be summed up by saying that they commence with an absolutely pure anhydrous oxide of barium which, while being alternately peroxidised and deoxidised, is most carefully protected from the presence of other elements or compounds that would otherwise enter into combination with it and destroy its efficiency.

Through the courtesy of the directors of Messrs. Brin's Oxygen Co., of Connaught Mansions, Westminster, we have been allowed to inspect the plant now in operation at Horseferry Road, where oxygen is being regularly produced. The retort power consists of two benches of retorts, thirty-six in each, which are charged with about three tons of pure oxide of barium. They are heated by gaseous fuel from a producer outside the main building, gas permitting an easier regulation of the heat than raw coal, as well as being more economical. The plant is in duplicate, and the pumps and their connections are so arranged as to serve alternately for charging and exhausting the retorts merely by reversing a three-way valve worked by a worm and pinion.

The arrangements for working the apparatus as nearly automatically as possible are very interesting to a chemical engineer, the automatic regulation of the temperature of the retorts being very easily effected by simple means. A vital point of the process consists in this proper regulation of the temperature, and the Messrs. Brin have studied it very carefully.

The air used in the process is first deprived of its moisture and carbonic acid by passing it through a lime filter, and is then forced into the retorts under the pressure of about one atmosphere, the residual nitrogen escaping through a loaded valve. In the absence of moisture and carbonic acid the activity of the baryta as above indicated remains permanent, but arrangements are introduced whereby the retorts may be easily turned from time to time without opening them, thus causing fresh surfaces of the baryta to be presented to the incoming air, and preventing it becoming too consolidated.

The normal productive power of the baryta after it has thoroughly become "in work," may be taken as 50 litres of oxygen per kilo. per operation, although the Messrs. Brin have obtained as much as 68 litres, the theoretical yield being 78 litres.

In a small furnace an operation can be completed in two hours or even less. On the comparatively large scale now being worked at Horseferry Road, the maximum speed has not yet been arrived at. We see no reason, however, why a large plant should not work with equal rapidity and with greater economy than a small one, details of heating and pumping power being duly apportioned. Indeed, a noticeable feature of the invention is its adaptability to all requirements, as whether for the lecture table of the professor or the work of the manufacturer, whether for producing one foot or one thousand feet per hour, the process is exactly the same and equally simple.

We understand that at present 12,000 to 13,000 cubic feet per day can be produced, but that the power available is insufficient to get full work out of the retorts. Allowing only eight operations in the twenty-four hours, 3,000 kilos. (three tons) should produce 42,000 cubic feet of oxygen per day, a sufficiently striking result.

Without assuming so large a production to be in all cases necessary, we will take, say, 6,000 cubic feet per day, and from what we saw at Westminster we believe that a plant for producing this quantity should not cost more than £1,000; and taking 5 per cent. for interest on capital, and 5 per cent. for depreciation, this would amount to 13½d. per thousand cubic feet. Of raw materials there are none to be paid for save the fuel employed for heating, and this should be done in a properly constructed plant for, at most, 12 cwt. of coal per day, which at 8s. per ton would be 0½d. per thousand cubic feet of oxygen. Roughly, and taking the labour into account, oxygen will cost about 3s. per thousand cubic feet to make by the Brin process, or four tenths of a penny per pound.

It now remains to inquire whether, with oxygen at 3s. per thousand cubic feet, it could be economically applied in any industrial operations. We say, most decidedly, Yes! To begin with, it is patent to the eye that the company at Horseferry Road is doing a regular, and no doubt an increasing, business in selling oxygen. There are two sets of compressing pumps, which take the oxygen from the gasholder in which it is stored and compress it into steel cylinders, which at a pressure of 120 atmospheres hold, according to size, from ten to two hundred cubic feet, measured at normal atmospheric pressure. In these it is conveniently sent out to those users of oxygen who, until recently, have been supplied from chlorate of potash. It is very clear that at twopence per cubic foot the company must command the whole of this existing trade, whether for the lime-light in theatres, microscopic or magic lantern work, or for more strictly industrial operations, such as refining platinum and some descriptions of blowpipe work.

But ignoring these existing uses, which will probably very much increase with a cheap supply of oxygen, we say that at 3s. per thousand cubic feet there is a field for its use of altogether different proportions, and practically limitless in extent, and we understand that the company far from wishing to keep the trade in its own hands, anticipates granting licences in various directions as the facilities for working the process, and its adaption to various industries, become known.

To mention only one important manufacture, we have recently noticed in the *Gas World* that Mr. Ogden, engineer of the Blackburn Gasworks, has applied it to a purpose suggested by Mr. Vernon Harcourt two years ago, viz., for revivifying and keeping active the oxide of iron in the purifiers, and with very favourable results extending over a period of nearly three months. Air has before now been tried and found useful, but it requires carburetting before use on account of the constituent nitrogen. With oxygen alone no carburetting is necessary, and ten cubic feet would suffice for one thousand cubic feet of gas. If oxygen can be produced for 3s. per thousand cubic feet—which we feel sure it can—the continual revivification *in situ* would not cost more than one halfpenny per thousand cubic feet of gas, and there would be other advantages apparent to every gas maker, such as absence of nuisance in opening purifiers and loss of gas consequent on doing so, less labour, and a stronger spent material to dispose of, while the purifiers would be kept in a constant state of activity, which is not the case under the ordinary methods now practised.

We understand that a new series of experiments in another gasworks is now being carried out under most careful supervision, and that, so far, they point to even better results than were obtained at Blackburn.

We cannot afford space at present to enter into the details of the many operations in which pure oxygen may be economically employed, but we shall watch with interest the development of this process, which, though old in theory, is young in practice, and even now would not have arrived at the stage of an industrial operation of such magnitude had it not been for the enterprise of those connected with the undertaking.

GAS-TAR AND ITS USES.

I. GENERALISATIONS.

In our article on the future of the benzol market on page 113, we clearly pointed out what would be the condition of the tar market if something was not done by the tar producers themselves in the way of lessening production. Our remarks were chiefly intended to point out to the tar producers of the United Kingdom the seriousness of their case, for it cannot be doubted that if large quantities of benzol are forced on to an already overstocked market a fall in value must result. It has been suggested by several writers in our contemporaries that the effect of our article has been to "bear" the market, and several correspondents have been good enough to call our attention to the fact that, notwithstanding our prediction, the price of benzol remains *in statu quo*. For the benefit of those doubting minds, especially those who think that "carbonising" has been snuffed out, we may say that it is not our opinion that benzol will go much lower during the next month or two, but that low prices will rule before many months are over we have not the slightest doubt. If "A Tar Distiller," "An Old Tar Distiller," and others were in possession of as much information as exists in this office they would not be any longer doubting, and in the place of writing letters which prove their ignorance of what is going on around them, they would spend their time in girding-up their loins to prepare for the great attack which is about to be made upon their stronghold.

To the tar producers, we would also say prepare, and put yourselves in readiness for those times which are coming—when the tar distillers, for want of better prices for their products, will not be able to offer so much for tar as they have been doing, and consequently the tar will be of more value as fuel than when sold for distillation purposes. For our own part we would rather see benzol at ten shillings per gallon, as one writer has suggested, but we fear such a price is further off than he imagines.

There has been much said upon the question, "What shall we do with our tar?" and the only real reply to such a question seems to be: Deal with it in such a manner as will yield most to the revenue. It may be sold for distillation, used for sundry purposes, or burned, and whichever produces the greatest amount of money to the producers of it should in every case be adopted. Respecting the distillation of gas-tar we shall have but little to say at present, our remarks being chiefly confined to utilising it by other methods,

pal of which is its use as fuel. Tar-firing may be tly described under two heads: (*a*) The supply of burner, and (*b*) the actual combustion in the furch latter may be again subdivided into (*b1*) Anderother similar plans, (*b2*) those processes in which a am is used, and (*b3*) those methods in which the tar is sprayed by means of a current of compressed

ative money values of tar and other forms of fuel of course, upon the efficiency of the apparatus and the attention given to the working of it. On he literature of the subject which is spread amongst ls devoted to gas-lighting, very various estimates of ncy of the different forms of burners are to be found; over, the amounts of tar consumed per ton of coal d in the several works where tar is being used as s very much indeed. It is easy enough to burn tar wastefully, but not so easy to consume it easily and ally, unless some pains are taken at the outset to atter on a proper basis. The supply of tar to the ad the regulation of the dampers, are the two main be considered, and without the foreman in charge pended upon to give the matter his earnest attenould be much better to adhere to the old plan of h coke. There are many places, however, where a drug that it can scarcely be given away, and in s coke can be sold at a high price; in such situaclearly a duty to use it as fuel and sell the whole duction. The whole question hangs on that of and it is necessary, in order to form a comparison, nly the best results which various experimenters ined. Anyone using tar as fuel should endeavour hese good results, and not be satisfied until he has them.

pply of tar to the burner is a most important point. manager who has had anything to do with this nows how extremely difficult it is to maintain a l even flow of such a small quantity of tar as is under the circumstances; the varying extremes of re, with such a viscous fluid as tar, renders it very get it to run through pipes of small diameter in an am, or to get it to flow past the aperture of an tap usually employed to control the efflux of luids. In our next article we shall endeavour to tar should be supplied to the burner, and the hemes and devices which have been used and are for this purpose.

(To be continued.)

AL EXHIBITS AT THE MANCHESTER EXHIBITION.

OUPS VI. AND VII. OF THE OFFICIAL CATALOGUE.

the head of fine chemicals there are several exhibits notice, many of which though in English cases are of foreign origin. As an exception to this statemay notice the very excellent show made by loward and Sons, of the City Mills, Stratford, the ine house. In this exhibit not only are the quinine ght to the front, but a number of other very pharmaceutical preparations. To look at this case s very forcibly not only of the progress we have rganic chemistry, both theoretically and in a manusense, but also of the very great strides we have edicine also. When we consider the vast agriculrest which is of necessity bound up with such a that of the Messrs. Howard's, we may well pause ourselves the question, Is it to the interest of generally that all this should be swept away, o make room for some product from coal-tar?

erman exhibits, however, carry off the palm in the fine chemicals. To most of our readers who are rers of such articles as soda-ash, basic slag, powder, tar products, and such like heavy such exhibits as those of Merck, of Darmstadt, or Schuchardt, of Görlitz, will possess but a passing interest, but if they think at all it must be to consider how completely we have handed over the finer and, perhaps, more paying operations to the foreigner, while we are contented to do the horse-work at home. To look at Cases 788 and 789 without envy must be a difficult task for the chemist who has any pride about him, but such will always be the case so long as our English professors are obliged to recommend their pupils to go to Germany to finish off their studies, on account of not being able to get this higher education at home.

Dr. Theodor Schuchardt's exhibit of German chemical preparations is one of the finest in the whole exhibition, and the presence of some of the rarer elements such as selenium, tellurium, germanium, thorium, tantalum, indium, and gallium, exhibit a striking contrast to the commonplace elements in some of the other cases. Dr. Merck's case contains some splendid specimens of the rare alkaloids—aloin, arbutinine, cocaine, digitalin, emetine, hyoscyamine, and many others.

At Stand No. 794, Messrs. Kay Brothers, of Stockport, have a very nice exhibit of miscellaneous articles—sea-water made potable, absorbent and antiseptic cotton wools, disinfectants, cement for broken articles, syrups, perfumes, and medicinal oils. The case has been very tastefully arranged, and is worth a study by those requiring such articles. At Stand 793 Mr. E. C. Stanford exhibits some products from seaweed, which are of a very interesting character. It is now many years since we saw and admired this system of treating seaweed, as exhibited at the Royal Polytechnic Institution, in London, but time changes all things, and the importation of iodine from the *caliche* districts of South America has put a different complexion on the treatment of seaweed.

Messrs. Grimshaw Brothers, of Manchester, by far the largest makers of zinc products in Lancashire, show a large collection of zinc salts in various conditions of purity, as well as other articles used in the sizing, bleaching, and finishing of cotton warps and piece goods. Chloride of zinc is largely used as a preventer of mildew, and if warps are treated with it in sufficient quantity it is impossible for mildew to make its appearance on them. The Messrs. Grimshaw also exhibit samples illustrating their patent process for the removal of the zinc coating from galvanised scrap-iron, using up both the iron and zinc, forming chloride, sulphate, oxide, or sulphide as required. Another section of their trade is illustrated by the exhibit of recovered indiarubber of various kinds, and of the chemicals, pigments, and drugs used in the manufacture of indiarubber, for which this firm has gained a reputation. A series of samples illustrating the prevention and removal of scale from steam-boilers, completes their list of exhibits.

Messrs. Thomas Christy and Co., of London, exhibit at Stand No. 787 a collection of raw and manufactured drugs, and such preparations as menthol cones, myocom fly gum, fibres, guttaperchas, tanning barks, etc.

Messrs. Mottershead and Co., of Manchester, exhibit a very extensive collection of chemicals used in the manufacturers' laboratory, in medicine, and in the arts, at Stand No. 791; while Messrs. James Woolley, Sons, and Co.'s exhibit has already been noticed when dealing with the subject of Hygiene.

What is described in the official catalogue as Group VII. or dyes and colouring matters from other sources than coal-tar, shows clearly the very slovenly way in which the committee has done its work. There are four exhibits in this group; one is chiefly of baking powders, harness blacking, cattle medicines, etc.; another chiefly of drawing instruments, while the two remaining are true to their group. Messrs. E. D. Milnes and Brother, of the Lumn Mills, Bury, whose speciality is dyewood extracts; and Messrs. Millward and Cryer, of 10, Greenwood Street, Manchester, indigo merchants. There are other indigo exhibits to be found in and amongst the other groups of the official catalogue, but why the committee should have considered them not to be dyes and colouring matters from other sources than coal-tar we are at a loss to conceive. If for some reason or other they were put in the background actually, they should have found

The air used in the process is first deprived of its moisture and carbonic acid by passing it through a lime filter, and is then forced into the retorts under the pressure of about one atmosphere, the residual nitrogen escaping through a loaded valve. In the absence of moisture and carbonic acid the activity of the baryta as above indicated remains permanent, but arrangements are introduced whereby the retorts may be easily turned from time to time without opening them, thus causing fresh surfaces of the baryta to be presented to the incoming air, and preventing it becoming too consolidated.

The normal productive power of the baryta after it has thoroughly become "in work," may be taken as 50 litres of oxygen per kilo. per operation, although the Messrs. [illegible] have obtained as much as 68 litres, the theoretical yield being 78 litres.

In a small furnace an operation can be completed in [illegible] hours or even less. On the comparatively large scale [illegible] being worked at Horseferry Road, the maximum [illegible] not yet been arrived at. We see no reason, however, [illegible] large plant should not work with equal rapidity [illegible] greater economy than a small one, details of [illegible] pumping power being duly apportioned. Indeed [illegible] able feature of the invention is its adaptability to [illegible] ments, as whether for the lecture table of the [illegible] work of the manufacturer, whether for producing [illegible] one thousand feet per hour, the process is [illegible] and equally simple.

We understand that at present 12,000 [illegible] per day can be produced, but that the [illegible] insufficient to get full work out of the [illegible] eight operations in the twenty-four [illegible] tons) should produce 48,000 cubic [illegible] sufficiently striking result.

Without assuming so large a [illegible] necessary, we will take, say, 6,000 [illegible] from what we saw at Westminster [illegible] producing this quantity should [illegible] and taking 5 per cent. for interest [illegible] for depreciation, this would [illegible] cubic feet. Of raw material [illegible] save the fuel employed for [illegible] in a properly constructed [illegible] per day, which at 8s. per [illegible] cubic feet of oxygen. [illegible] account, oxygen will [illegible] make by the Brin process [illegible] pound.

It now remains to [illegible] thousand cubic feet, [illegible] industrial operations [illegible] begin with, it is [illegible] Horseferry Road [illegible] increasing, but [illegible] compressing pump [illegible] holder in which [illegible] cylinders, which [illegible] according to [illegible] measured [illegible] to convenience [illegible]

suggested [illegible] certainly, in all justice, be taken [illegible] usefully to compare the short [illegible] with the achievements of the present and [illegible] One of the shortest paragraphs [illegible] Royal Sanitary Commission was [illegible] should be provided for the study of [illegible] which may be defined as the application of [illegible] medical sciences to the preservation of the [illegible] community at large. It includes *(a)* medical [illegible] and sanitary statistics; *(c)* preventive [illegible] from curative, medicine." It seemed [illegible] had arrived when they might fairly ask [illegible] progress had been made in this direction, [illegible] had actually or potentially a Minister and a [illegible] Department of Public Health; but, in the first [illegible] proposed to examine very shortly the history of [illegible] and other steps which had been taken of late [illegible] to the subject. The first sanitary legislation [illegible] they need go back was that which culminated in [illegible] Health Act of 1848. The early public statutes of [illegible] of Richard II., Henry VI., Henry VII., and [illegible] VIII., to which reference was sometimes made, had [illegible] with what we now understood by that [illegible] There was no doubt that from the reign of George [illegible] the growing wants of populous towns caused [illegible] bodies to apply to Parliament for private or [illegible] Acts in order to gain powers for improving the sanitary [illegible] and supplying the essential health requirements of [illegible], so that the stir of public alarm which [illegible] the outbreak of cholera in 1831, and which brought [illegible] a variety of administrative and Parliamentary activities, [illegible] precedents already established through the self-[illegible] capacity of the greater municipal organisations. [illegible] experts might smile or point their moral, but after [illegible] what basis for legislation was more legitimate or more [illegible] of our English methods of proceeding than the [illegible] of experience? These must not only be collected and [illegible] by experts and assimilated in the mind of the [illegible], but must be brought home to the convictions of the people before they could be accepted or subscribed to in the shape of positive enactment. But, however that might be, it was certain that the period between 1832 and 1848 was marked by the passing of the Quarantine Act of the former year; by the Lighting and Watching Act of 1833; by the great Municipal Corporation Act, 1835; by the Improved Registration Act, 1836; by important reports of the Poor-law Commissioners; by Parliamentary inquiry into causes of disease and of excessive mortality; by Mr. Chadwick's well-known report to the Poor-law Board, 1842; by the Royal Commission presided over by the Duke of Richmond in 1843-5, and its results in the Nuisance Removal and Diseases Preventive Acts, 1846; in the Town Improvements Act, 1847; and finally by the Public Health Act, 1848. The second outbreak of cholera, which occurred in 1849, was followed very naturally by attention on the part of the Legislature to such subjects as common lodging-house regulations, and improved water supply, while progress was made under the facilities of the Public Health Act of 1848 in carrying out local works of drainage and sewerage. The third visitation of cholera was followed by conspicuous activity in Parliamentary dealings with nuisance removal and disease prevention by the Acts of 1854-5. The establishment of the Metropolitan Board of Works in 1855, with new and comprehensive powers for the main drainage of London, superseding those of numberless vestries, was one of the most important improvements of the last half-century. The Local Government Act, 1858, with the amending Act of 1861-3, the Diseases Prevention Act, and Nuisances Removal Act, brought them down to the important epoch of 1869, which was marked by the appointment of the Royal Sanitary Commission. Of all the Royal Commissions which had been constituted in our times few had been more ably manned and none had been so directly and immediately successful in their result, for within the short space of five years almost the whole of their wise and well-considered recommendations were carried into effect. In giving a short account of that

consequences, LORD BASING said their were that there should be one central ters; that there should be one but one only, for each sanitary area; be amended in certain particulars give effect to the first recommendation the Local Government Board was estab- introduced by Mr. Stansfeld. This was in following year Mr. Stansfeld introduced a he succeeded in passing, the effect of vide the whole country into urban and to establish one sanitary authority for every area, and to amend the law in numerous impor- It was, however, reserved for the Govern- Mr. Disraeli, and the Parliament of 1874, to carry the most troublesome, and, perhaps, the most of the recommendations of the Commissioners, consolidation of the sanitary law, which was bled by the Public Health Act, 1875. During the years it had been in force it had required only a few tively unimportant amendments, and it might be contain the most complete sanitary code that was to in any country.

some voluminous remarks upon the politics of on, LORD BASING concluded his address with the g remarks:—Let it not be said that we come only hesy smooth things at Bolton. We know the energy pacity of the Lancastrian population. We must not from holding up before them the highest ideal; and I ld the material advantages which are involved in ned efforts after sanitary improvements. Thus our the North may become, as we should desire, a useful s locally, as well as a signal manifesto of the principles ess, and of the great national objects we have in view.

DR. DUPRÉ ON WATER AND SEWAGE.

riday, Mr. AUGUST DUPRÉ, Ph.D., F.R.S., presided principal section, and delivered an address dealing ter analysis and the treatment of sewage. The mere g out of an analysis was, he said, comparatively g, a simple matter; it was the true interpretation of lts obtained that tried the knowledge and experience analyst. That difficulty was felt very early in the of water analysis, and many attempts had been o overcome it by laying down certain general ds to judge by, water being divided into good, bad, different. Against the setting up of such general ds he wished to raised his voice. All such standards llacious, and served only as crutches for the ignorant upon. The chemist who thoroughly knew his work require them, and those who required them were not ndertake water analysis at all. It was the existence e general standards which so often led to mistakes. mple of water was condemned because it contained a ore organic carbon or yielded a little more albumenoid ia, or absorbed a little more oxygen from perman- than had been laid down as a standard, while another was cheerfully passed because in those particulars it thin the standard. Yet the first water might be y wholesome and unpolluted in the proper sense of m, while the second might be entirely unfit for use. as we were dealing with definite compounds or with ng organic matters, however injurious they might be, always possible to state a quantity below which if ey would not prove injurious; the moment, however, re dealing with living organisms capable of self- cation, that ceased to be the case, for what might be nitesimal quantity in the water might become a us quantity in the body of the consumer. What kind then did he recommend in analysing water? It was formity of the water to or its divergence from the character of the waters and the district from which it of the geological formation from which it sprang. words, district standards and not general standards be used. Alluding to the treatment of sewage DUPRÉ said he *had often thought that from* a sanitary point of view the production of sewage, usually so-called, namely, the water carriage of our house refuse, was a mistake. However, for good or evil, the plan had been adopted, and we must do the best we could in endeavouring to dispose of it satisfactorily. The first point that all authorities who had to deal with the disposal of sewage should clearly understand was, that sewage was a nuisance to be got rid of and not a thing to make a profit from. The next point was that if sewage was to be disposed of to the greatest advantage to the community the sewage of every place should be dealt with separately, for no general scheme would do equally well for all. Many schemes had been suggested for the proper disposal of sewage, but he had not time to deal with them in that address; he would, however, like to throw out some suggestions on the general aspect of the question. He was decidedly of opinion that whatever scheme was adopted,—except the destruction of the sewage materials by fire,—the agents to which the ultimate destruction of sewage was due were living organisms—not necessarily micro-organisms—either vegetable or animal. If that were so, our treatment of sewage should be such as to avoid the killing of those organisms, or to hamper them in their action. We ought rather to do everything we could to help them in their beneficial work. The treatment of sewage ought to begin in the sewers. He was aware that sewers were laid with a view to bringing the sewage in the shortest possible time from the source of production to the general outfall, but even in towns of moderate size the time which elapsed during the passage of the sewage between the two points was sufficient to render it offensive, at least in the summer time; while in large towns the sewage had time to become very highly offensive. While an attempt was made to remedy that, the use of powerful antiseptic disinfectants should be avoided, in order that the action of the beneficial organisms to which he had referred might not be checked. He had the less hesitation in saying that, because on the score of expense it was practically impossible to really disinfect infectious matter when once it had found its way into the sewers. All that was usually done in that direction really was based on self-deception on the part of those who employed such means. All that could be done was to deodorise the sewage, and that could be done without in the least interfering with the immediate or subsequent action of the organisms on which we depended for the final destruction of the sewage. The best material for that purpose was, in his opinion, a solution of permanganate of potassium prepared on the spot from crude manganate by the addition of acids or suitable salts. It should not be supposed that all that was thereby secured was simply the deodorisation of the sewage, for by that means we could in a great measure check putrefaction and thus do away with what seemed to be the chief agent in carrying disease germs into our streets and houses, namely, the rising and bursting of gas bubbles from the sewage. When thus treated sewage would arrive at the outfall in a practically inodorous condition, or nearly so, according to the amount of manganate used, and would be fit for any kind of treatment we might wish to adopt. Lime was frequently used in the treatment of sewage, but that material had a tendency to produce in course of time putrefactive changes. Of course there were other methods of dealing with sewage, the next best of which he considered to be filtration. The next to that plan of filtration was the system of discharging the sewage into a river, and he believed that, provided the river was large enough, a community might be justified in adopting that plan where any other would entail on them very great cost. But in any case natural agencies should be allowed to have their way. Our object should be to assist and direct those agencies into proper channels, and to interfere with them as little as possible.

IMPURITIES IN WATER.

Mr. PERCY F. FRANKLAND read a paper on "The application of bacteriology to questions relating to water supply." After giving the results of certain experiments, he said they showed that, whilst ordinary drinking water did not form a suitable medium for the extensive growth and multiplication

[illegible] and [illegible] great [illegible] pollution [illegible] many cases [illegible] vegetable [illegible] no pos- [illegible] polluted is [illegible] be entirely [illegible] with those [illegible] with infective [illegible] are equally [illegible] possible way [illegible] human system of [illegible] perform the experi- [illegible] to be pursued. [illegible] very little to the [illegible] Micro-biology must [illegible] cultivation methods [illegible] on water pollutions. [illegible] of the water, or its [illegible] out whenever any [illegible] water from all possible

[illegible]

[illegible] paper on "The air [illegible] he described numerous [illegible] conjunction with Professor [illegible] acid was no measure of the [illegible] air of a room. Sewer gas [illegible] micro organisms, and in that [illegible] outside air in towns, in [illegible] as a rule, the outside [illegible] sewer air with micro-organisms. [illegible] be avoided, for in such [illegible] soon became contami- [illegible] The connection of sewer air [illegible] on satisfactory evidence [illegible] His observations on the [illegible] have no weight against any [illegible] the connection between sewer [illegible] they had greater weight [illegible] on which the sewer air theory [illegible] wish it to be supposed that [illegible] from drains were in every [illegible] to him highly probable that a [illegible] contaminated in that way, was [illegible] simply because it was unpleasant. [illegible] contained in such air might, [illegible] otherwise, have a very serious [illegible] In any case he felt confident that the atten- [illegible] given to the means of preventing such [illegible] worth the trouble. But in the present [illegible] knowledge on the subject we should [illegible] to sewage emanations cases of [illegible] know the cause, and patiently [illegible] as to the real causes, whether [illegible] or floor damping materials, [illegible] ly, or elsewhere.

[illegible] the people to get hold [illegible] in the paper read by [illegible] was free from danger, [illegible] better live in sewers.—

[illegible] laughter.) The methods used by Dr. Hal[illegible] [illegible] Carnelley were good so far as they v[illegible] might be millions of micro-organisms in the [illegible] sewers which had not yet been discovered, [illegible] those which were the source of danger.

THE SEWAGE QUESTION AND RIVER PO[illegible]

Mr. COLLINS had prepared a paper on "I[illegible] in Lancashire and how to meet it." In descr[illegible] resulting from the pollution of our Lancashir[illegible] Collins said these evils are not confined to dwe[illegible] for all riparian landowners or residents within [illegible] many ways. The stream which flows throu[illegible] cannot be drunk by the cattle. The old house [illegible] on the river bank is rendered uninhabitable [illegible] intolerable stenches. People are subject to pe[illegible] ance, or even ill-health, the money value of t[illegible] diminished, houses are rendered tenantless a[illegible] and "life on the waters" is rendered impossib[illegible] turing refuse in the stream is surely a grave er[illegible] its remedy is much more readily applied th[illegible] sewage. The bleacher contributes nothing [illegible] properly considered a very serious pollutant. [illegible] maker can, and in some cases does, apply c[illegible] ments to his mill effluent which renders [illegible] innocuous. The printer and dyer have a [illegible] problem before them; but with settlement and [illegible] careful filtration, and other well-known means, [illegible] escape much outcry. Sewage, however, is mo[illegible] constitutes the greatest bulk of polluting fo[illegible] rivers. It is a very variable but always co[illegible] Sewage is water polluted with an almost infi[illegible] matters, some of which are in supension, while [illegible] solution; but both are in such condition and [illegible] render the liquid foul and dangerous to deal [illegible] successfully. It is obvious that filtration will [illegible] water of matters in suspension. But filtrati[illegible] sensible degree affect pollutants which are in [illegible] which are frequently most damaging and pres[illegible] quantity. Where settlement, precipitation, an[illegible] not affect the desired degree of clarification a[illegible] tion, other and special means to meet the [illegible] adopted. It may be taken for granted that no [illegible] for which there is no remedy, and it is equally [illegible] remedy should be applied by the person or a[illegible] initiates the nuisance, and that before passin[illegible] neighbour.

In a paper "On the sanitation of dwellin[illegible] other buildings in especial reference to the sew[illegible] Mr. G. S. JONES said: Bearing in mind the [illegible] purification of river-water, in consequence of [illegible] the atmosphere of its contained organic matt[illegible] some years held the theory of oxidation as [illegible] sequel to this great social question. Precipita[illegible] or aluminic salts, although quite practicab[illegible] quantities of sewage, is quite out of the questi[illegible] place as the metropolis, for in the latter case [illegible] quite as troublesome as the disease, resulting in [illegible] daily-increasing "sludge," which has itself [illegible] subsequent treatment ere it can be finally dispos[illegible] with respect to the "effluent" water, here a[illegible] with almost the original difficulty, for what is [illegible] from the precipitation process but the original s[illegible] only the small percentage of its impurity? Ther[illegible] to the scheme of irrigation. Here one has to [illegible] most formidable of objections, viz., effluvium [illegible] land upon which raw, even chemically-treated [illegible] been allowed to flow. The latest suggestion fo[illegible] of sewage, I am not a little astonished at. [illegible] reception by the river of all the original se[illegible] untreated condition, relying upon the afores[illegible] property of the running stream. But even if thi[illegible] place to an appreciable extent, there would sti[illegible] immense excess of organic matter, viz., t[illegible] suspension, which would accumulate on the be[illegible] of the river. The suggestion to which I am

ttention is, what I may conveniently term, "the ak system," and which consists in the supply to lling-house of two separate cisterns, one supplied drinking water for culinary purposes, and the other ater-closets, urinals, etc., only; this second one some cheap and effective disinfectant, oxidiser, ptic. Now, I do not think that any substance can be as embracing all these three qualifications so well inated soda." I would therefore suggest that such uld be inspected, time after time, either by the mpany's inspectors, or those of the Board of Works Committee as the case may be; and, moreover, should follow neglect in keeping such water mpregnated by the chemical.

SMOKE ABATEMENT.

aper on this subject Mr. HERBERT FLETCHER that unless it could be shown that smoke was , there remained no reason for its continuance, e difficulty of burning coal without making it. That so burnt there was ample evidence, and there were akers of efficient mechanical stokers and perfect venters who could provide anyone whose chimney lained of with the means of entirely, and not par- , discontinuing his nuisance. It was customary to fireman for the smoke; but except with unusual er, and also unusual quality of fuel which admitted oked at the front of the fire, the fireman was power- vent it. What was to be done to abate the smoke If the local magistrate would not fine more than the trouble the nuisance inspectors had to take to onviction, we might perhaps get such cases removed cal influences to another court. It was more pro- wever, that all authorities would lean to public nd if they thought that those who live in and near gh really wished to have it cleaned they would do .

J. R. DUNCAN (secretary of the National Smoke t Institute), in a paper on the same subject, the numerous enactments passed with a view to l to the smoke nuisance, after which he remarked cts in force had frequently been rendered inopera- ministrators of the law were in many cases large of smoke themselves, especially in manufac- tricts, and they would not grant committals if they id doing so; when fines must be imposed they hem to sums so much below the minimum pre- the Act that they become quite useless, and the continued as great as ever. In Bolton not more r six cases of prosecution for smoke nuisance had during the last ten years. The last was on 28th is year, when a conviction was obtained, and a fine costs was imposed.

LAND D. ORVIS also read a paper on smoke .

iscussion which ensued Mr. F. SCOTT (secretary anchester Noxious Vapours Abatement Associa- he was heartily in favour of Lord Stratheden pbell's bill, which would give power to the orities to insist upon effective smoke-consuming being adopted, even in the case of ordinary

R. E. COLES (engineer to the Home Department) t that to secure a satisfactory abatement of the sance it would be necessary to include all sources of mestic as well as industrial.

motion of Mr. LEACH (chairman of the Bolton ard), seconded by Mr. F. SCOTT, a resolution was uesting the Council of the Sanitary Institute to take a view to ascertain which are the best appliances g an abatement of the smoke nuisance.

OIL WELL.—An extraordinary rich oil well has k near Krosno, in Galicia. The oil rushes out endous force, rising to a height of 150ft., and veral hundred barrels *a day*.

SPECIAL NOTICE.

THE favour already accorded to **The Chemical Trade Journal** is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, **the Organ** of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

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ng replaced by other methods. There remains another—most interesting new process—to be mentioned. It is posed by Messrs. Carey, Gaskell and Hurter. They ain the earlier portion of the Leblanc process, and manuture sulphate of soda in the usual way. This they heat th sulphate of ammonia, distilling off ammonia, and ming at the same time a bi-sulphate of soda. This latter heated with common salt, producing the neutral sulphate, d liberating hydrochloric acid, which can be employed in e manufacture of bleaching powder or otherwise. The eutral sulphate of soda so formed is dissolved in water and ixed with the recovered ammonia. This, treated with rbonic acid, yields bicarb-ammonia, with formation of lphate of ammonia to be used again in a subsequent peration. Much labour has been bestowed on the development of this most interesting process, but the work is not yet mplete. It will be noticed that the only materials used in t are common salt and carbonic acid, the results being rbonate of soda and hydrochloric acid. The sulphuric acid nd the ammonia which take part in the operations are ontinually recovered and returned to the process.

(To be continued.)

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

(Continued from page 132.)

PASSING by some of those old operations in which a sesquioxide of manganese was produced, and from which a protoxide was to be dissolved out with weak acid, leaving the peroxide to be acted upon by a stronger acid for the production of chlorine, we may turn our attention to actual processes which have been at use on the large scale, whereby the base has been removed from Weldon mud before its entry into the still, as, partly on account of the improvement it undergoes by such treatment, a separate operation was in some instances found to pay very well.

On the Tyne, and indeed in some instances in East Lancashire, the acid from the salt-cake pots was alone used for the manufacture of bleach, the acid from the open roasters, specially where raw coal was employed for firing, was rushed down in such a weak state as to be useless for chlorine making. On the other hand, the lime used for the manganese recovery process contained notable quantities of carbonic acid and magnesia, so that the employment of the one naturally led to the elimination of the other. Acid, too weak o liberate chlorine economically, may still be used successfully to dissolve out the protoxide of manganese, though it must not be forgotten that its too free use may very materially essen the quantity of manganese which can be passed through he oxidiser in a given time.

An ounce of practice is worth a pound of theory; we may, therefore, give an analysis of the mud produced in a works using lime containing an undue proportion of magnesia, before and after treatment with dilute acid.

Settled mud :—	*Grammes per litre.*
Manganese peroxide	110·8
,, protoxide	24·8
Lime	44·0
Magnesia	3·1
Iron peroxide	traces
Alumina	2·0
Sulphate of lime	8·1
Calcium chloride	170·7
Silica	4·0

Mud after treatment with weak acid :—	*Grammes per litre.*
Manganese peroxide	70·4
,, protoxide	7·8
Lime sulphate	9·7
Manganese chloride	21·4
Calcium chloride	142·3
Alumina	2·0
Magnesium chloride	12·9
Silica	1·2

It will thus be seen that by treatment with weak acid, the strength becomes so reduced that a still charged in the usual way would only yield $\frac{1}{7}$ of the chlorine which could be produced by a still of the ordinary settled mud. This is a very serious consideration, and such a process clearly demands that a settling should take place after the addition of the weak acid in order to send the mud into the stills as strong as possible; but it is also shown that the clear liquor from which the treated mud has settled cannot be run away as it contains manganese, and it must therefore be treated in this dilute state in the oxidiser. Of course it will be readily seen that there are many processes by which such a liquor could be concentrated; for instance, 1·3 equivalents of milk of lime might be added in the neutralising well, or even in the oxidiser, and the whole allowed to settle, the clear liquor being run away and the settled mud being mixed up with a fresh batch for blowing; but anyone knowing how careful most manufacturers are to avoid going even one step outside the beaten track, will pause before making any suggestion in this direction.

Proposals have also been made to neutralise the acid of the still liquor with the base of the mud, of which each exists in about equivalent quantities. Ordinary still liquor requires about one-fifth of its bulk of mud as usually made for the one to neutralise the other. Such a process as this would require two extra operations, and under the altered values of manganese, acid, lime, and fuel as they exist to-day, it is perhaps not worth the additional outlay. In working such a process as this, due care must be taken to have an outlet for impurities. The main impurity is sulphate of lime, and various means have been suggested for dealing with it. Weldon suggested chloride of barium; Davis, simple settling of the still liquors; while Strype proposed to eliminate the sulphuric acid from the crude tower salts before it ever entered the process—quite a practicable operation.

Roughly, it may be taken that a ton of pure peroxide of manganese will make two tons of bleach, whether the peroxide be in the form of native ore, or whether it be regenerated mud. Further, a ton of bleach will not require any less acid when made by means of Weldon's process than when made by the old way, so that any saving which now takes place is in the cost of materials, labour, fuel, repairs, and interest on capital due to regeneration being less than that incurred in purchasing half a ton of peroxide of manganese in its equivalent of 70 per cent. native ore. Reckoning oxidiser lime at 7s. 6d. per ton of bleach, fuel at 3s. 6d., loss of manganese at 2s., wages at 4s., depreciation and interest on capital at 10 per cent., say 2s. per ton, in all 19s. per ton of bleach. To make a ton of bleach by the old process requires 14 cwt. of 70 % manganese, costing at present price 35s., so that if the manganese be wasted as it was formerly, there is only an advantage to the possessor of the Weldon apparatus of some sixteen shillings per ton.

(To be continued.)

BLAST FURNACE TARS.—Professor Watson Smith, lecturer in chemical technology in the Victoria University, briefly described to the Iron and Steel Institute at their recent meeting in Manchester, what he had done since 1883 in the way of investigating the chemical constituents composing the blast furnace tar of the Gartsherrie blast furnaces. It was found that the blast furnace tar was very rich in phenols and phenoloid substances. The tar was evidently a transition tar,—*i.e.*, transition from tars of the paraffinoid to those of the benzenoid or ordinary gas tar varieties. Among other by-products he extracted from the tar and smoke was a dyestuff with which he had dyed a piece of flannel scarlet; and toluene, a little of which he also exhibited. That toluene was the root substance from which both artificial indigo and that wonderfully sweet substance saccharine were prepared, specimens of which he had also much pleasure in showing. It was thus a somewhat wonderful thought that from the fumes of coal-fed blast furnaces it was possible to obtain ammonia to serve as a manure or in the manufrcture of alkali, disinfectants and antiseptics in the form of creosote constituents, scarlet dye rivalling Turkey red, indigo, and a substitute for sugar, viz., saccharine.

LIQUID FUEL: ITS ADVANTAGES FOR FIRING STEAM GENERATORS.

BY B. H. THWAITE, C.E., F.C.S.

(Continued from page 140).

THE new arrangement consists as follows:—The liquid hydrocarbon is injected by steam into the centre of a retort placed in the centre of the steam generator furnace; the steam and oil pass backwards and forwards through the retort and become, on contact with its sides, converted into gas. The gas issues in an annular ring from front end of retort, and, striking against a divert-plate of air receiver, returns around outside edge of retort, and the gas is here met with an annular blast of air, producing a hollow cylinder of flame in the inside of which is the retort, encircled with flame from end to end. The outside periphery of the flame is in close contact with the perforated refractory linings of flue, that not only become incandescent and prevent the oxidising action of flame on the plates, but prevent a too serious reduction in the temperature of the flame. The steam is preferably kept at a temperature above 50lb. per square inch; at a pressure below 30lb. per square inch the steam was found to reduce the temperature of the retort very rapidly and prevent the volatilisation of the liquid hydrocarbon. By a simple and exceedingly effective equilibrium valve arrangement, an exact balance of air and gas can be established, so as to produce a clear, bright, beautiful flame, which in this invention resembles that from purified coal-gas. So perfect indeed is combustion that a clean sheet of note-paper held in the chimney for an hour was not in the least discoloured by smuts. The tests were conducted at the Hecla Engineering Works, Bamber Bridge, near Preston, on July 28th and 29th. The boiler was of the marine type, about six years old, but in good condition. Its dimensions are 8ft. 6in. by 5ft. 6in. diameter; the central flue is 2ft. 8in. diameter, and is provided with two cross Galloway tubes. It has a nest of forty 2½in. tubes, and a direct heating surface of 313 square feet. The tubes were cleaned from deposited carbon before commencement of trial, which in the first day's experiment lasted from 5-10 to 8 p.m., and in the second day's experiment from 11-15 a.m. to 2-30 p.m. The oil supply tank was carefully calibrated and graduated. The water was supplied from two casks carefully gauged and graduated by actual volumetrical measurement; a piston water-meter was obtained for the experiment, but the head of water supply was insufficient to actuate the piston. The volume of air used was ascertained by a Biram's anemometer, corrected by Davis of Derby. The temperatures of chimney gases were taken by a mercurial thermometer. The temperatures of combustion in furnace were taken by a Siemens' specific heat pyrometer side by side with a Murrie's pyrometer; the latter instrument resembles an ordinary mercurial barometer, with the lower end coupled to a pressure indicator. The mercury volatilises at its upper end on being immersed in the furnace, the pressure of the vapour being transmitted through the intermediate fluid to the indicator, which is graduated to show the corresponding temperature; this instrument is admirably adapted for its purpose, and its readings correspond sufficiently near to those given by the Siemens' pyrometer. The chimney gases and those generated by retort were aspirated into two gas-collecting vessels, but owing to defects of stopper corks (due to transit) it was not considered useful to proceed with the analysis of the contained gases.

Throughout both experiments there was, with the exception of a few minutes, a perfect immunity from smoke, the exception being simply light-coloured vapour. After the trial the tubes were examined, and found quite free from deposited carbon. In preliminary experiments it was noticed that when the retort was cold (and inert in its influence on the oil and steam) the flame produced was very smoky, but as soon as the temperature of the retort attained the degree necessary for the volatisation of the oil the flame became quite clear and beautiful. The steam was quite dry, and drove all the machinery in the fitting shop. The pressure varied from 55lb. to 75lb. In the first day's experiment the air for combustion was supplied by natural draught; the arrangement of air receiver enabled an equable an supply of air to be obtained.

The blast furnace oil used for the two experim from Coatbridge, Scotland, analysed, at the author's by Mr. Alfred Allen, of Sheffield, F.I.C., F C.S., w to have the following elementary composition:—

	1	2	Av
Carbon	83·380	83·900	8
Hydrogen	10·530	10·650	1
Sulphur	0·087	0·088	
Oxygen by difference	6·003	5·872	

The proportion of phenoloid bodies soluble in alk per cent. leaving 83 per cent. of hydrocarbons, sp. gr

The same quality of oil calorimetrically tested William Thomson, F.R.S., Ed., gave the following

Fahrenheit units of heat	1
Equivalent to lbs. of water from and at 212° Fahr. converted into steam by 1 lb. of oil.	1

(To be continued.)

Notes and Queries.

FIRE AT A TANNING WORKS.—The extensive works of Messrs. Porter and Senager, Montreal, ha burned down, involving damage estimated at 200,00

EXPLOSION AT CHEMICAL WORKS.—Last w explosion occurred at the works of Messrs. Brown chemical manufacturers and tar distillers, Dewsbur foreman, noticing one of the stills, which was fill boiling tar, was leaking, attempted to draw the ma by applying a shovel full of fire to the tap attached still. The blaze came in contact with inflammable a cooler boiler, and the loud crash which followed heard miles around. Two men where injured, one s

DEATH OF A WELL-KNOWN PAPER MAKE Thomas Routledge, of the Ford Works Company Sunderland, died in London on Saturday, the 17th u over seventy. In early life the deceased carried c making at Oxford, where he took out a patent for paper from Esparto grass. The patent proved success and wrought a great change in the art c making. The deceased went to the north shortly aft and formed the limited company with which he h been connected.

THE SALT DISCOVERIES NEAR HARTLEPO official test of the pumping appliances recently put the Grentham salt beds, near West Hartlepool, was fully applied on Wednesday, the 14th ult., when 10-horse power engine, on the American system, la by Mr. Vivian, was put into operation. A depth tubing has been sunk to the extent of 975 feet, whe of salt, nearly 100 feet thick, has been discovered, ar found on testing that the brine contained 28 per sodium chloride. A large reservoir is to be bu Grentham station, where will be placed six evaporati and subsequently six others, and there will be railway depôts, and workshops. It is believed by experts whole of the land leased overlies a thick salt bed lated to yield 280,000 tons of domestic or fishery salt

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MOR

IN the bulk of the lines the Scotch market this w sents features practically unaltered from those of la Sulphate of ammonia is decidedly weaker, howe transactions are rumoured at hardly a fraction ov although these are not fully confirmed. Bleach i moderate demand at unchanged quotations; while other hand the inquiry for bichromates has recov fair extent over the week. One item of importance to the latter is the decision of the makers to deliver t consumers on conditions similar to those ruling the

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in dif localities may vary.*

	£	s.	d.
ACIDS:—			
,, Acetic, 25 °/₀ ... ... per cwt.	0	10	3
,, ,, Glacial ... ... per lb.	0	0	6⅞
,, Arsenic... ... ... per cwt.	0	12	9
,, Chromic °/₀ ... ... per lb.	0	0	4¼
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	6
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	2¼
,, Oxalic ... ... ,,	0	0	4⅛
,, Sulphuric (fuming 40 °/₀) ... ... per ton	12	0	0
,, ,, (Brimstone 168°) ... ,,	4	5	0
,, ,, (Pyrites 168°) ... ... ,,	3	10	0
,, ,, (spent oxide 168°) ... ,,	4	0	0
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	2	0	0
,, Tartaric ... ... per lb.	0	1	7
Arsenic, white powdered ... ... per ton	10	12	6
Alum... ... ... ,,	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3½
,, = 24° ... ... ,,	0	0	1¾
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per ton	22	5	0
,, ,, (sal-ammoniac) ... per cwt.	34/- & 32/-		
,, Sulphate (grey), London ... per ton	11	17	6
,, ,, (grey), Hull ... ... ,,	11	15	0
Aniline Oil ... ... per lb.	0	0	9¾
,, Salt ... ... ,,	0	0	8¼
Antimony... ... ... per ton	35	0	0
,, (tartar emetic) ... ... per lb.	0	1	0
Barium Chloride ... ... per ton	7	10	0
,, Carbonate (native) ... ... ,,	4	0	0
,, Sulphate (native levigated) ... ,,	3	5	0
Bleaching Powder, 35 °/₀ ... ... ,,	7	6	3
,, Liquor, 7 °/₀ ... ... ,,	2	12	6
Bisulphide of Carbon ... ... ,,	12	5	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... ,,	0	3	9
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. London, per unit per cwt	0	1	3
Benzol, 90 °/₀ ,, ... per gallon	0	2	8
,, 50 °/₀ ,, ... ,,	0	2	1
Carbolic Acid (crystallised 35°) ... per lb.	0	1	2
,, (crude 60°) ... ... per gallon	0	3	9
Creosote (ordinary)... ... ... ,,	0	0	1½
,, (filtered for Lucigen light) ,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C. ,,	0	1	3
Grease Oils, 22° Tw. ... ... per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ... ,,	0	11	6
Coke-oven Oils (crude) ... ... per gallon	0	0	1½
,, (distilled) ... ... ,,	0	0	2
Copper (Chili bars) ... ... per ton	39	15	0
,, Sulphate ... ... ,,	14	0	0
,, Oxide (copper scales) ... ... ,,	36	15	0
Glue ... ... per cwt.	1	17	6
Glycerine (crude) ... ... per ton	33	0	0
,, (refined) ... ... ,,	53	0	0
Iron (turnings)... ... ... ,,	1	13	0
,, Peroxide (blue billy) ... ... ,,	0	7	0
,, ,, (bog ochre) ... ... ,,	1	13	0
,, ,, (precipitated ... ... ,,	3	0	0
,, Sulphate (copperas) ... ... ,,	1	2	6
,, Sulphide (antimony slag) ... ... ,,	1	0	0
Lead (sheet) for cash ... ... ,,	13	10	0
,, Acetate (white) ... ... ,,	26	15	0
,, ,, (brown ... ... ,,	19	0	0
Nitrate ... ... ,,	22	10	0

	£
Lime, Acetate (brown) ... ... per ton	9
,, ,, (grey) ... ... ,,	13
Magnesium (ribbon and wire) ... ... per oz.	0
,, Chloride ... . per ton	2
,, Carbonate .. .. per cwt.	1
,, Hydrate ... ... ,,	0
,, Sulphate (Epsom Salts) ... per ton	2
Manganese Sulphate ... . ,,	19
,, Borate .. .. per cwt.	2
,, Ore, 70 °/₀ ... ... per ton	2
Methylated Spirit, 60° O.P. ... ... per gallon	0
Naphtha (Wood), Solvent ... ... ,,	0
,, ,, Miscible, 60° O.P. ... ,,	0
OILS:—Castor ... ... per cwt.	1
Cotton-seed ... ... per ton	21
Linseed ... ... ,,	21
Lubricating, Scotch, 885°—890° ... ,,	5
Petroleum, Russian ... ... per gallon	0
,, American ... ... ,,	0
Silver (metal) ... ... per oz.	0
,, Nitrate ... ... ,,	0
STARCHES:—	
Sago ... ... per cwt.	0
Potato (farina) ... ... ,,	0
Sodium (metal) ... ... per lb.	0
,, Carb. (refined Soda-ash) 48 °/₀ per ton	5
,, ,, (Caustic Soda-ash) 48 °/₀ ,,	4
,, ,, (Carb. Soda-ash) 48 °/₀ ,,	4
,, ,, (Soda Crystals) ... ... ,,	2
,, ,, (Crystal Carbonate) ... ,,	5
,, Chlorate ... ... per lb.	0
,, Borate (Borax) ... ... per cwt.	1
,, Bichromate... ... ... per lb.	0
,, Hydrate (74 °/₀ Caustic Soda)... per ton	8
,, ,, (70 °/₀ Caustic Soda)... ,,	7
,, ,, (60 °/₀ Caustic Soda, white),,	6
,, ,, (60 °/₀ Caustic Soda, cream),,	6
,, Bicarbonate ... ... ,,	6
,, Hyposulphite ... ... ,,	5
,, Nitrate (95 °/₀) ex ship Liverpool per cwt.	0
,, Silicate (glass) ... ... per ton	5
,, ,, (liquid, 100° Tw.)... ... ,,	4
,, Sulphate (Salt-cake)... ... ... ,,	1
,, ,, (Glauber's Salts) ... ,,	2
,, Sulphite ... ... ,,	5
Potassium (metal) ... ... per oz.	0
,, Bichromate ... ... per lb.	0
,, Carbonate, 90% ... ... per cwt.	0
,, Chlorate ... ... per lb.	0
,, Hydrate (Caustic Potash) ... per ton	23
,, Nitrate (refined) ... ... per cwt.	1
,, Prussiate Yellow ... ... per lb.	0
,, Sulphate, 90 °/₀ ... ... per ton	10
,, Muriate, 80 °/₀ ... ... ,,	9
Strontium Hydrate, 98 °/₀ ... ... ,,	7
Sugar, Beet ... ... per cwt.	0
,, Cane ... ... ,,	0
Sulphocyanide of Barium ... ... per lb.	0
,, Ammonium ... ... ,,	0
Sulphur (Flowers) ... ... per ton	9
,, (Roll Brimstone) ... ... ,,	5
Superphosphate of Lime (28 °/₀) ... ... ,,	2
Tallow ... ... ,,	22
Tin (metal) ... ... ,,	105
,, Crystals ... ... per lb.	0
Zinc (Spelter) ... ... per ton	15
,, Chloride (solution 96° Tw.) ... ... ,,	5

, carriage free, but there is still an advantage t discount left to the credit of the latter. One hromate of potash and bichromate of soda, ng direct with English customers, has just sidential agent for the Midlands, and all the w thus represented. The paraffin strike is at and makers have the prospect of soon getting in. Prices for the time retain the recent rise. tions are :—Soda crystals, 46s. 6d. net Tyne ; s. 6d., less 2½ °/₀ Glasgow ; borax, English and boracic acid, £46, net Glasgow ; soda- d., less 10 °/₀ Tyne ; caustic soda, white, 76°, 2°, £7. 12s. 6d., and cream, 60/62°, £6. 5s., iverpool ; bicarbonate of soda, 5 cwt. casks, t. casks, £6. 5s. net Tyne ; refined alkali, 1⅛d., yne ; salt-cake, 24s. net Glasgow ; bleaching 12s. 6d. to £7. 15s., less 5 °/₀ Glasgow ; f potash, 4½d., and of soda, 3½d., less 5 °/₀ trate of soda, 9s. 3d. ; chlorate of potash, 6d., port ; sulphate of ammonia (nominal), £11. 5s. f.o.b. Leith ; paraffin scale, hard, 2d. to 2¼d. ; d. to 1¾d. ; paraffin wax, 120°, semi-refined, d. ; naphtha, 7d. to 8d. ; sulphate of copper, Imports at Clyde ports for the week included erphosphates, 1,484 barrels tar, 150 barrels ks sulphate of soda, 250 bags asbestos, 1,655 4 barrels rosin, and 135 barrels wax.

IE TAR PRODUCTS MARKET.

tar products remain without change since our o's benzol at 2s. 8d. and 50/90° at 2s. 1d., naphtha may be said to have held its own. ood inquiry for creosote, but anthracene oil, s anthracene, is verily a drug. Carbolic acid and we hear London values have risen to 4s. Anthracene is also in good demand, and it will s if it rises to a high figure before the end of the oduction will not be much increased, and there Pitch is sick, and we see no hope for it in arge stocks exist, especially at Runcorn, and over-stocked.

ULPHATE OF AMMONIA MARKET.

of speculators have caused the market to the past few days, but for prompt delivery n this month (September) is over a further be made to depress prices. For September was sold at £11. 15s. f.o.b. Hull, and during days the value rose to £11. 16s. 3d. and Unless the makers pull well together low e for October, but as some quantity is sold for may happen that the demand at the end of the use prices to stiffen again.

THE PATENT LIST.

ing list has been compiled expressly for THE RADE JOURNAL *by* G. F. REDFERN & Co., *4, South Street, Finsbury, London, E.C.*

PLICATIONS FOR LETTERS PATENT.

ANDER FELDMANN. For improvements in the uction of aluminium and alloys of aluminium. ember 16.

LES SAMUEL BEDFORD. For new or improved uring matters, and process of manufacturing the . September 19.

IAM LLOYD WISE. For process for the manu- re of sodium-ammonium-sulphite, and con- ng the same into sodium-sulphite and sodic- ate. A communication from George Moritz ber, of Saxony. *September 19.*

12692. JOHN IMRAY. A communication from La Société Anonyme des Matières Colorantes et produits Chimiques de St. Denis, Alcide François Poirrier, and Zacharie Roussin, of France. For production of colouring matters by combination of nitro-diazobenzoles and their analogues with isomers of naphthionic acid. September 19.

12,700. SYDNEY PITT. A communication from Victor Ragosine and Paul Dvorkovitch, of Russia. For method of producing anhydrous sulphuric acid and its monohydrate, and of utilising for this purpose the acid residues of petroleum production and other, as also sulphates of all metals. September 19.

12736. RALPH ASHTON. For an improved method of preparing blue for laundry use. September 20.

12856. CHARLES ANTHONY BURGHARDT and WILLIAM JAMES TWINING. For improvements in the production of aluminium and aluminium bronze. September 22.

COMPLETE SPECIFICATIONS ACCEPTED.

14407. ORLANDO MORTON THOWLESS. For improvements in the manufacture of aluminium chloride and in the extraction of aluminium therefrom. November 8, 1886.

14,711. JAMES SIMPSON and ED. WM. PARNELL. For improvements in apparatus for use in the treatment of sulphuretted hydrogen for the separation of sulphur, or for the production of sulphurous acid. November 13, 1886.

15007. CHARLES ESTCOURT, HARRISON VEEVERS, and M. SCHWAB. For an improved continuous process for the purification of coal-gas from sulphur compounds by which the sulphur is recovered. Nov. 18, 1886.

15182. EDWIN POWLEY ALEXANDER. A communication from Etienne Joseph Louis Delsol, of France. For a process for obtaining mother liquors free from magnesian salts in the manufacture of carbonate of potash by means of the double carbonate of potash and magnesia. November 22, 1886.

15222. WILLIAM BURNS. For improvements in purifying sewage and other foul liquids, and in making oil, alkali, and cement from sewage precipitate, and in apparatus for that purpose. November 23, 1886.

15363. DUNCAN STEWART. For improvements in preparing grey and black colouring matters to be applied to textile fabrics and materials. November 25, 1886.

8953. RICHARD BENJAMIN AVERY. For an improved method of and apparatus for generating gas for illuminating, heating, and metallurgical purposes from liquid hydrocarbons. June 23, 1887.

10723. RICHARD CUNLIFFE and JAMES LUND. For improvements in apparatus for calcining, drying, roasting, or carbonising substances or materials, and extracting gases, spirits, or acids therefrom. August 4, 1887.

11492. HENRY HARRIS LAKE. A communication from Adolf Kayser, Horace Williams, and Albert Barnes Young, of United States. For improvements relating to the production of caustic alkali, carbonates of the alkaline metals, muriatic acid, and other substances. August 23, 1887.

11493. HENRY HARRIS LAKE. A communication from Adolf Kayser, Horace Williams, and Albert Barnes Young, of United States. For an improved method or process of producing silicate of sodium or of potassium. August 23, 1887.

11,494. HENRY HARRIS LAKE. A communication from Adolf Kayser, Horace Williams, and Albert Barnes Young, of United States. For an improved method or process of producing muriatic acid. August 23, 1887.

bleaching powder makers are rising in the field, and coming to the front, and the low price of alkali, with the comparatively high price of bleach, will always have this tendency. Under these circumstances we doubt the wisdom of the whisperings lately come to our ears that the price of "tower salts" is to be again increased from 6d. to 9d. per bottle for 28° Tw. Dyers, calico printers, and bleachers, will, no doubt, be up in arms against raising the price of their raw materials, and we have heard from several sources that if such a course is pursued diluted oil of vitriol will, in most instances, take the place of "tower salts." For ordinary "sours" and other such like purposes, even now vitriol properly diluted is just as effective as muriatic acid, *and far cheaper*. Vitriol is verily a drug, and it may be that it will find many outlets in this direction.

The economical use of oil of vitriol for "sours" may be well shown by the following figures:—A ton of brown oil of vitriol of 140° Tw. contains 1,680 lb. of real monohydrated sulphuric acid, and will neutralise 1,817 lb. of carbonate of soda; at 40s. per ton—a price which would be very tempting to the alkali maker—the user could neutralise 3·7 pounds of carbonate of soda for one penny.

A bottle of "tower-salts" weighing 1 cwt. can now be purchased for 15d. at the user's works, or 25s. per ton; a ton will neutralise 887lb. of carbonate of soda, so that the user of it could only neutralise about 2·9lb. of carbonate of soda for one penny with tower-salts, as compared with the 3·7lb. when using oil of vitriol.

It is in this way that conventions divert products waiting for more general application into other channels, or to use a more popular expression, "kill the goose laying the golden eggs."

A YEAR'S BOILER EXPLOSIONS.

SIR THOMAS GRAY, assistant secretary to the Board of Trade, in his fifth annual report upon the working of the Boiler Explosions Act, 1882, says:—The number of preliminary inquiries held under section 6 of the Boiler Explosions Act, 1882, in the course of 12 months ended 30th June, 1887, is slightly below the average for the four preceding years during which the Act has been in operation. The loss of life from explosions is also below the average; the figures for the five years being:—

	Cases.	*Lives Lost.*
1882–3	45	35
1883–4	41	18
1884–5	43	40
1885–6	57	33
1886–7	37	24

In addition to the 24 persons who were killed by boiler explosions in 1886–7, there were 44 persons injured. The reports of the inspectors by whom the preliminary inquiries were held present no new features so far as the chief causes of the explosions are concerned. Of the 37 cases 17 were attributable to the use of boilers which were either worn out or in a seriously defective condition, while 15 cases arose from faulty designs or defective safety-valves or other fittings. As instances of exceptional mismanagement on the part of steam users, it may be mentioned that one boiler referred to was 34 years old, and was worked, until quite recently, at double the pressure for which it was intended when new; while in another case the boiler was completely worn out, the safety-valve very defective, and the only means of feeding was by pouring water through the safety-valve orifice before steam was raised. There were three explosions of heating apparatus caused by severe frost. In each case the pipes appear to have become choked with ice, and as no safety-valve or other means of relief was provided, an explosion [illegible] the consequence. There were also three explosions of [illegible]s in the boilers of tramway engines, two of them due to [illegible]ing of the tubes, and one to an accumulation of scale. [illegible] case was the seventh boiler made by the same firm, [illegible] led from the same cause (*i.e.*, grooving at [illegible]*ums), since the passing* of the Act. Proper inspection would doubtless have shown the exis[illegible] defect; but the inspector in reporting upon the ca[illegible] the grooving to the bending action set up by th[illegible] joints, and remarks that with well-formed wel[illegible] joints no movement of the kind would take pla[illegible] cases the boilers were under the inspection of boil[illegible] companies. In only three of the insured case[illegible] were the explosions attributed to defects wh[illegible] thorough inspection on the part of the insuring officers would have revealed. The work of these [illegible] is no doubt often performed under considerable [illegible] arising not only from the unwillingness of some [illegible] to incur the loss of time and outlay necessary for [illegible] also from the lack of sufficient opportunities [illegible] thorough inspections; but the figures above refer[illegible] seem to show that, notwithstanding these dra[illegible] examinations made under the direction of the [illegible] during the year have, in the main, been condu[illegible] satisfactory system.

GAS-TAR AND ITS USE

II. TAR AS FUEL.

IN the use of tar as fuel, whether for heating r[illegible] steam-boilers, heating stills, or for any other sim[illegible] whatsoever, the heating value must not be reckon[illegible] theoretical heat units calculated, nor from the [illegible] evolved in any experimental calorimetric apparat[illegible] as the supply of air to the fuel undergoing combu[illegible] immensely from that required in actual practice. [illegible] fuel be properly burned, a very small quantity [illegible] is needed; whereas, with solid fuel, the genera[illegible] twice that theoretically required, and with careles[illegible] more than this. It is easy to see what a loss is [illegible] by the introduction of an excess of air. It is [illegible] this case to distinguish between the actual num[illegible] units evolved during the combustion and the ter[illegible] the flame. Solid fuel in its use renders it very [illegible] conduct the air equally to every particle of the bu[illegible] air channels are apt to be formed, so that in eff[illegible] plete combustion, as we have already stated, [illegible] quantity of air has to be heated, and this excess [illegible] heat again but very incompletely. According to [illegible] Naumann, the flame temperature of carbon bur[illegible] bonic acid is 2736° C., but if double the quant[illegible] admitted, then the flame temperature sinks to [illegible] C., and this is why such elements as platinum ca[illegible] ever, be brought to melting point by the heat [illegible] through the combustion of solid fuel. The rel[illegible] ever, become quite different when the fuel is first [illegible] into the gaseous form and then burnt. Combustil[illegible] air permit of being mixed in any proportion desir[illegible] in this connection that the burning of gas-tar as [illegible] studied.

The results of many experimenters have establi[illegible] that 55lb. of gas-tar will do as much work wh[illegible] managed as 100lb. of gas-coke, and from these [illegible] readily calculated that each oven in a bench of [illegible] require about three gallons of gas-tar per hour. T[illegible] per hour is an exceedingly small quantity, and [illegible] application of this small quantity that the diffi[illegible] Not only must the air supply be well regulated, [illegible] be properly distributed to ensure perfect comb[illegible] even when all this is done, if the tar suddenly s[illegible] without warning, the occurrence will be disastro[illegible] gas-making is concerned. Anyone who has end[illegible] use gas-tar as fuel will have discovered how ver[illegible] is to regulate the supply by means of a tap; soo[illegible] it is sure to get closed by small particles of [illegible] pitch, or thick tar, or even by the small particles [illegible] carried over mechanically from the retorts in th[illegible] gas-making. How to avoid these stoppages h[illegible] problem of many, and the first may be set before [illegible] as an ordinary tar-screen or sieve.

Messrs. Sansom, Bros. and Co., of Mansfield, [illegible] and sold a tar-burner, devised by Mr. Heydon

works there, and connected with it is the device illustrated by fig. 1 as the tar-screen. The illustration to a large extent explains itself, and is intended to arrest all those fine particles which would in time accumulate behind an open or partly open tap and tend to choke it. Unless this filter or sieve be detached occasionally and cleaned, it will of course choke up and the supply be interrupted, so that in using them for a number of ovens, the only rational way seems to be to detach them all at a given hour each morning and night, and to put a cleaned one on in its place. This might readily be done by the man in charge of the furnace, and would be equivalent to the operation of cleaning and trimming lamps, and would moreover be much simpler than cleaning an ordinary coke fire at the end of each shift. It is only some such regular system as this that will enable even tar-screens to be used with success, and it is a further *sine qua non* that a previous filtering should have taken place on a larger scale, so as to prepare the tar for these smaller filters.

Fig. 1.

At figs. 2 and 3 is shown the tar regulator of Mr. A. Thomas, of Cowes. Fig. 2 is a section showing the method of construction, while fig. 3 exhibits it *in situ* at the furnace. The instructions given with this regulator show that it is liable to become choked if a previous filtering of the tar has not taken place.

Fig. 2.

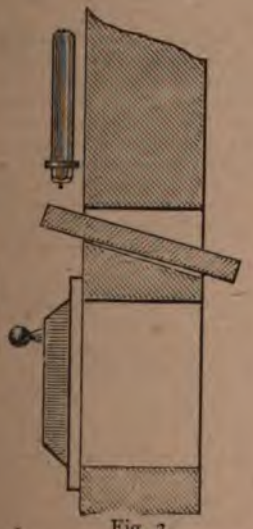

Fig. 3.

Mr. Thomas gives the following direction as to fixing :—He says : "We will suppose you have, or can have, a tank for tar raised a few feet above the furnace ; if the tank is an open one it must be closed with a dust-tight lid. In this lid leave a manhole, in which there must be placed a very fine sieve through which the tar must pass, as success depends upon the tar being clear. The regulator will only require screwing in by hand ; let the *T* fit well, but not tight, as you will have to swing the pipe *away to change the* regulator occasionally. It is best to have the regulators in duplicate, and so change them now and then for cleaning."

Better by far than any system of filtering or screening is the plan recommended by Mr. George Livesey, and published on page 685 of last year's *Journal of Gas Lighting*. Mr. Livesey regulates the flow of tar by means of a quarter-inch brass tube, having a bore of about one-eighth of an inch ; a considerable amount of friction takes place in this tube on account of the viscous character of the tar, and therefore it is quite easy to regulate the flow by means of varying lengths of pipe.

Fig. 4.

Mr. J. Smith, the manager of the Bangor gasworks, writes to say that he has found this method to answer well, and that after trying all other systems he has come back to the plan of having only one large tap to the cistern, and a coil of pipe of the size already mentioned at each furnace, such as may be seen at Fig. 4. He states that he keeps three lengths of coil to suit varying quantities, as well as changes in the fluidity of the tar and the temperature of the furnace ; the coils are three feet, four and a half feet, and six feet in length respectively, and one or other of these lengths is used as may be found necessary. The regulation of the stream of tar by means of these tubes is all that can be desired ; the stream is constant and requires no watching, and there is but little danger of the tubes getting stopped. It is only necessary to have the level of the surface of the tar in the overhead cistern about five feet above the top of the coil. Mr. Smith states that with this tube regulator the quantity of tar used is about twenty gallons per ton of coal carbonised, a result quite as good, if not even better than any we have ourselves obtained.

There are several other devices in use for supplying tar to the burner, but the foregoing are the most practical, as it is certain that unless the appliance be automatic it is not of much use. The filtration of the tar, although so simple, has not been sufficiently recognised by those who have attempted to use it as a fuel, and it may be taken for granted that had the tar been able to reach the burner in a constant and regular stream there would not have been many complaints against the system. If those who are about to burn tar during the coming winter will set this task before them, they will already have gone a long way towards making the process a success.

(To be continued.)

LIQUID FUEL.

THE *Liverpool Journal of Commerce* makes the following extraordinary statement, in which a pound of oil is made to do the work of 5 pounds of coal :—At the invitation of Mr. Henwood we made several trips in his steam launch, the *Ruby*, to test the running powers of her engine when fired with liquid fuel. The course was from Westminster Bridge to Millbank, taking the big clock at the former place for timing purposes. The *Ruby* is 5 tons register, 38 feet over all, and 5 horse-power nominal. The oil was fed from a tank on top of the boiler, and the consumption was registered by a float, pulley, and weight. In an hour's run the gauge showed 3½ inches, equal to a trifle under 4 gallons of oil per hour. The mean pressure of steam was 65 lbs., and the speed was 7·8 knots. Compared with coal, this shows a decided advantage, the mean for coal being 6·3 knots per

hour. Some time back we were present at a trial held by Mr. Henwood on his system of liquid fuel, and he had not then quiet conquered the difficulties of preventing the escape of gases and smoke from the funnel when slackening speed or stopping altogether; but these later trials have proved that they have been overcome, and the combustion is almost perfect. In two runs, each of an hour's duration, the following table shows the difference between coal and liquid fuel:—Liquid fuel, brick furnace—Pressure of steam, 65 lbs.; revolutions per minute, 288; mean speed per hour, 7·8 knots; indicated h.p., 23; consumption per hour, 4 gallons; with a perfectly clean furnace. Coal—Pressure of steam, 60 lbs.; revolutions per minute, 240; mean speed per hour, 6·3 knots; indicated horse-power, 20; consumption, 1½ cwt. The storage of oil is another important feature which compares very favourably with coal. The *Ruby* can take on board sufficient oil, occupying very little space, to steam 24 hours, whereas with coal only enough can be stored away to last 10 hours. There is only one tank, a very small one, over the boiler, to feed the fire direct. The oil is pumped into this from two tanks, placed one on each side of the vessel. There was absolutely no vibration, and the runs were a success. Mr. Henwood will be glad to have the company of any gentleman desirous of seeing his system in operation.

There evidently is something wrong somewhere.—Ed.

LIVERPOOL MINERAL MARKET.

Minerals.—There is little alteration to report in our market this week. Manganese: Arrivals have been again rather heavy, but prices continue easy. Magnesite (containing 98 per cent. carbonate of magnesia) unaltered at 30s. for raw lump; raw, £6 10s.; and calcined ground, £12. Bauxite (Irish Hill quality) continues firm; lump, 20s.; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals have been very much above the average, but prices remain steady at 85s. to 90s. per medium, and 95s. to £5 for the best G.G.B. Barytes continues scarce, especially for best qualities, Carbonate: Finest selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8 10s. Sulphate: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, G.G.B. brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone in fair demand; ground, £6 10s. to £7, specially selected lump, finest quality, £9 to £10 10s. Iron ore continues quiet. Purple ore quiet at 7s. Emery-stone steady at £5 5s. to £5 15s. for lump; smalls, £5. Fluor and felspar without change. Fullers' earth quiet; (Emerald brand)—best lump, 50s.; fine impalpable ground, £7. Wolfram and tungstate of soda unchanged. Tungsten metal unaltered at 2s. 6d. per lb. Tungsten alloy 2s. per lb. Chrome ore: There is more inquiry, but prices continue easy—that is, 80s. to 85s. for 50 per cent, and 60s. for 40 per cent. Antimony ore, £8 to £10 for fair quality; best, £18 10s. Antimony metal, £31 to £32 10s. Uranium 29s. to 32s. 6d. Asbestos: Best rock, £18; brown grades, £14 to £15. Potters' lead, £10 to £11. Calamine quiet, 60s. to 80s. Strontia: More doing; sulphate (celestine) 19s. to 20s. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Plumbago: Best Ceylon lump, £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £5 to £15 per ton. French sand, 19s. Ferro-manganese firmer, 80 per cent. packed, £11. 2s. 6d.; 70 per cent. packed, £10; 60 per cent. packed, £8 16s.; 50 per cent. unpacked, £7 15s.; 40 per cent. unpacked, £7 5s. Spiegel, 20 per cent., £4. 12s. 6d. Silicon spiegel, 9 per cent., £8. Chrome pig, 9 to 10 per cent., £8 to £8 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8.

A Large Fire.—A large coal heap, estimated at 11,000 *tons*, at the Alliance Colliery, Wigan, was recently discovered *to be on fire.*

LIQUID FUEL: ITS ADVANTAGES FOR FIRING STEAM GENERATORS.

BY B. H. THWAITE, C.E., F.C.S.

(Concluded from page 154.)

The thermic value calculated from Mr. Allen's analyses, with Favre and Silbermann's calorific coefficients, gives the oil as equal to 18·411, or 16 per cent. in excess of the actual calorimetric estimation. In the first day's test, perfect combustion was effected with 22 per cent. excess of a supply of air over that theoretically necessary to effect complete oxidation of the oxidisable elements of the oil. In the second day's experiment a forced air draught supply was used, the source being a Körting's injector. By this system the combustion was more localised and intense, and the temperature of the chimney was rather higher, and as will be seen the efficiency was below that of the first day's experiment with natural draught. The efficiency shown by the results of the first day's experiment with natural draught, and estimated on the basis of the calorimetric value of 16·66 of water evaporated per pound of liquid fuel from and at 212° Fah., along with Mr. Allen's analyses as a synthetical basis to arrive at the composition of the gas produced was as follows:—

First Day's Experiment—Natural Draught.

(Note.—Figures in brackets refer to lbs. of water evaporated from and at 212° Fah.)

Net actual evaporative efficiency (14·97)	89·87 °/.
Net useful evaporative efficiency after deducting steam for aspirating oil (14·33)	85·99 °/.
Net thermic efficiency, including the heat carried away by, and necessary to elevate, the products of combustion up the chimney (15·90)	95·42 °/.
Heating surface efficiency in lbs. of water evaporated per square foot per hour	2·392
Heat absorption efficiency tested by Carnot's law where average initial temperature of combustion flue 1720° Fah., and average final chimney temperature 248° Fah., then $\frac{1720-248 \times 100}{1728}$.....	85·57 °/.

Second Day's Experiment—Forced Draught.

Net actual evaporated efficiency (14·21)	85·25 °/.
Net useful evaporative efficiency after deducting steam for aspiration of oil (13·58)	81·50 °/.
Net thermic efficiency, including the heat carried away by, and necessary to elevate, the products of combustion up the chimney (15·42)	96·6 °/.
Heating surface efficiency in lbs. of water evaporated per square foot per hour	1·936
Heat absorption efficiency tested by Carnot's law where average initial temperature in combustion flue 1700° Fah., final chimney temperature 262° 40" Fah., then $\frac{1700-262 \times 100}{1700}$	84·53 °/.

In order to test the author's system applied with the factors of efficiency to Russian petroleum residuum, the author obtained a sample of astatki from Baku. Mr. Allen's analyses of this oil are as follows:—

	1.	2.	Average.
Carbon	84·94	84·59	84·94
Hydrogen	13·91	14·05	13·96
Oxygen by difference ...	1·15	1·36	1·255
	100·00	100·00	100·155

Mr. William Thomson's calorimetric test with the same oil gave— 18611·2 British thermal units.

Equivalent to lbs of water from and at 212° F. converted into steam by 1 lb. of the oil ..... 19·28

The thermic value of the astatki, calculated from Mr. Allen's analyses, with Favre and Silbermann's calorific coefficients, gives the oil as equal to 20·927 Fah. units, or 11 per cent. in excess of the actual calorimetric estimation.

The net useful evaporative efficiency of the Baku astatki (taking the actual percentage efficiency results with blast furnace oil as a basis of calculation, and that of the calori-

metric test as the coefficient of evaporative value of the astatki) would therefore be 16·58lb. of water per pound of oil from and at 212° Fah. The following table gives the comparative evaporative values expressed in pounds of water evaporated for a shilling's worth of coal delivered free on board on the Mersey, of astatki, when the projected pipe lines are completed; of blast furnace oil free on board on the Clyde, and of astatki at the present price at the port of Novorossisk on the Black Sea.

Description and price of fuel.	*Lbs. of water evaporated from and at 212° Fah., per shilling's worth of fuel.*
Coal at 12s. 6d., cost of loading 1s. 6d., firemen at 1s. per ton—total 15s., containing 90 per cent. combustible. Tested by calorimeter, evaporated 8·14lb. of water per pound of fuel (from and at 212°), delivered free on board on the Mersey	1215
Blast furnace oil, delivered free on board on the Clyde, of 0·92 sp. gr., at 25s. per ton	1258
Baku astatki if delivered on the Mersey at £1 10s., of which 19s. is for freight, and 11s. is the cost of oil at Batoum	1238
Baku astatki delivered free on board at Batoum at 10s. 11d. per ton	3390
Kuban crude oil at Novorossisk at 24s. per ton	1547

As already stated, the oil-tank railway wagons and storage tanks at Batoum are utilised for the storage of refined petroleum, and there are no present facilities for the transport and storage of the astatki. There is to be a pipe line over the Sarum Pass, but this is also for refined petroleum. According to a letter that the author has just received from Mr. C. J. Donald at Batoum (who is acting deputy for our vice-consul, Mr. Peacock), the right to construct a pipe line over the Sarum Pass, and which is expected to be completed by the coming March, was conceded conditionally on the projectors' undertaking not to export the crude oil; the Russian government insisting on the crude oil being utilised inland for the benefit of the people. Now, as the exportation of the oil would carry an enormous amount of capital into the country, which would enable the vast liquid treasures of the Aspsheron peninsula to be fully developed, this policy is not conducive to Russia's best interests, and cannot be a permanent one.

Astatki can now be obtained in limited quantities at Novorossisk (the Black Sea port of the Kuban oil region, which is about sixty miles inland) for about 24s. per ton.

It is evident, therefore, that for given value, even in the form of blast furnace oil, liquid fuel, if rationally utilised, may be considered to be an economic fuel; and if its use is once established, the development of the oil fields will be enormously accelerated. The net storage capacity required per ton of fuel is 33 cubic feet for oil and 40·5 cubic feet for coal; but for a given value in thermal units the oil would only occupy three-eights the capacity of that of coal. In many instances the oil could be used for ballast, thus leaving considerable cubic capacity free for shipment of storage. *The oil would always be available for calming purposes in the event of a dangerously heavy sea.* With reasonable precautions, the use of liquid fuel would be quite as safe as with coal or solid fuel.

The other *prima facie* advantages may be enumerated as follows:—

1. Reduction of weight of fuel.
2. Instantaneous extinction of furnace fires.
3. Avoidance of loss of heat due to the frequent opening of furnace doors.
4. Greater cleanliness and freedom from ashes.
5. More equable generation of steam.
6. Greater efficiency of evaporation per unit measure of heating surface.
7. Increased power of steam generators.

EXPLOSION OF MOLTEN STEEL.—By the recent explosion of molten steel in Shropshire, one man was burnt to death and four others seriously injured.

THE RECENT DEVELOPMENT OF THE SALT TRADE IN SOUTH DURHAM.

[FROM A CORRESPONDENT.]

DURING the last three years the development of the salt trade in South Durham has been at a rapid rate, and it is having a marked effect on the allied chemical trade of the Tyne. The alkali manufacturers had for years drawn most of the supply of salt from Cheshire, and the cost, with that of the long leadage on railways, appreciably affected the ability of the maker to compete with those who from the situation of their works were either able to utilise the brine or to have an abundant supply of cheap salt. Now that there is a large production of salt in South Durham, the chemical makers on the Tyne have not only the raw material cheaper, but its proximity to their works enables them to save probably from 4s. to 5s. per ton in carriage, which is a saving that has enabled them to compete with other districts on a footing of somewhat greater equality. This result is important, and the history of this recent development has a corresponding interest.

Sinking for fresh water in their ironworks in Middlesbrough, Messrs. Bolckow, Vaughan & Co. discovered a bed of rock salt about 100ft. thick and at a depth of over 1,200ft. The strata passed through were in the upper new red sandstone. The discovery was made in the year 1862, but for years the difficulty in winning the salt from so great a depth prevented any practical result from following. In 1874, a firm on the northern bank of the river, Messrs. Bell Brothers, sank a bore hole to test for salt, and found it at a slightly less depth, 1,127ft. Still there was little or no attempt made to utilise the discovery, until in 1881 a method was suggested by Mr. Thomas Bell which has been put into practice, and which previously had been carried out in the east of France. The boring was effected by the "diamond borer"—a hollow crown, in which carbonate crystals are set, and the rapid revolution of which wears away the strata it passes through, and thus may be said to scoop out a core of the earth, much as a cheese is pierced for tasting. The bore hole thus made from the surface to the salt is lined, a wrought-iron tube being introduced from the top to the bottom of the hole. The lower portion—that passing through the salt bed itself—is pierced with holes; an inner tube is also placed within the outer, and thus between the inner and outer there is an annulus, down which fresh water flows, either from the surface or from the strata traversed. The water finds its way through the holes at the bottom, and becoming saturated with salt rises in the inner tube to the level its specific gravity enables it to reach—210ft. or so from the top, according to the depth of the entrance of the fresh water. Thence it is pumped to the top into the brine reservoirs. This was the method almost universally used in South Durham to reach the salt, and most of the bore holes put down have been thus made. But there is a newer method, novel in the application to salt boring, which has been applied successfully during the past few months. It is of American origin, and those who carry it out are transatlantic workmen. By this method, after the bed-rock is reached, a string of drilling tools is lowered into the well sunk through the surface ground to the rock, and there they are suspended from a beam above the surface. This beam is adapted to receive a rocking motion, and by it a series of blows are conveyed to the auger or drill on the rock, which rises and falls with tremendous effect, pulverising the rock. By a smaller windlass called a sand-reel, a contrivance is worked for removing the detritus from the well. The beam above the surface is described as the "walking beam," and is connected by a rod with a crank attached to the axle of a band-wheel, which runs in bearings on uprights, and revolves by a band driven by a steam-engine. The auger-stem, the most important part of the tools, is often 30ft. long, and the "bit" over 3ft., and the falling of this heavy steel tool for perhaps twenty inches cuts the rock with a quickness most remarkable. In the first bore hole thus drilled in South Durham, in September last, as much as 100ft. of rock was drilled through in one day; and in one of the latest completed ones, in March of the present year, a

distance of 95ft. was cut through in a day, the hole so drilled being one of 8in. diameter. In the latter case a bore hole 1,000ft. in depth was cut in twenty-two working days.

The method of raising the brine is the same in both cases. From the reservoir it is pumped as required into saltpans to be evaporated. By firing in the ordinary method, or by surplus heat from other sources, the brine is raised to the necessary temperature, and the crystallisation of salt follows. Crystals of salt form in regular cubes, and float on the top of the water; cube after cube attaches itself to its fellow, until the mass is too heavy to float longer. Thin pellicles of salt may form a crust on the surface, and thus prevent or lessen evaporation. This pellicle of salt is broken therefore, and evaporation becomes more rapid, and the salt falls to the bottom of the shallow pan. Every 48 hours the salt thus formed is drawn to the side of the pan, raised on to the platforms between two pans to drain, and thence it is wheeled to the store or to the railway trucks. It is a process of manufacture which is ancient, and though modification of method and pan, and of use of the fire needed in boiling, have been often attempted, the old processes remain substantially unaltered. A change has been made in South Durham in at least one instance. A firm of salt makers own blast furnaces near to the saltpans, and surplus heat from these furnaces—gases that have done duty in heating air before it enters the furnace—find a further service in heating the pans of brine to evaporate the salt.

The salt beds are now known to extend for five miles to the north of the Tees, the furthest point proved being at Greatham, four miles from West Hartlepool, but a bore hole is about to be put down within the bounds of the latter town. The beds vary in thickness from 60ft. to 100ft., so that though the exact area cannot be stated the contents are, it is clear, enormous. Besides the two firms already named as engaged in the work, four others have entered into it since, two of the four being chemical-making firms from the Tyne. The production for the year 1885—the first year of any large output—was 53,037 tons, and for the year 1886 it rose to 98,562 tons; but, large as this output was, it was not a twentieth part of the salt produced in Great Britain. Since then the output has been increased, though it fluctuates with the freedom or otherwise of the bore holes from accident. At present the capacity of production may be said to be a little over 4,500 tons weekly, the number of pans being about 70. The whole of the chemical works on the Durham side of the Tyne may now be supplied from the South Durham works, and two of these have entered into the manufacture of fishery salt, for which there is a local demand, whilst another maker produces table salt. In the further extension of the salt trade in South Durham, which seems certain, it is probable that the export trade will have to be developed in order to enlarge the output.

ON THE PRESENT POSITION OF THE ALKALI MANUFACTURE.*

(Concluded from page 153.)

In estimating the effect which these various processes must have on the future of the soda manufacture, it should be borne in mind that at present very little hydrochloric acid is allowed to run to waste. Of the whole salt now decomposed in the United Kingdom, amounting to 713,000 tons per annum, the [illegible] ric acid from only 12,000 tons, less than a per c[illegible] at is wasted. The rest is all made with chlorine [illegible] resent price of bleaching power is the [illegible] ld not be permanently lowered [illegible] the manufacturers for main- [illegible] for no more chlorine can [illegible] without at the same [illegible] on which, at present [illegible] This condition con- [illegible] ge in some of the

As things stand at present, therefore, a furt price of soda-ash would not harm the Leblanc r since they can advance the price of bleaching pc cient measure to recoup themselves. But if any should develope a process whereby more blea can be made per ton of salt decomposed thai done, he would have an immediate advantage adopt such a process, things would re-establish at present, as far as profit goes, but the Le would produce less ash, and those using the : cess would produce proportionately more.

The real struggle will only arise when bleach cheaply made in connection with the ammoni: is not in my power, I doubt if it is in the powe to calculate the exact cost of the various proces now, as it were, in array, one against the other, general estimate may be formed.

It should be remembered that if the contemp recovery processes are brought to bear, the L facturer will be benefited not only to the e amount now expended upon the purchase of also to the extent of the profit he can make phur at the rate charged for it in the form of p selling it as sulphur in competition with that r from Sicily. Mr. Weldon has shown in his adc that the amount of sulphur exported from Sici the quantity that could be thus produced by al manufacturers. Also, it is known that the pr sulphur does not yield a handsome profit to the ducer. The presumption is, therefore, that t will not be permanently much depressed, so that all cost of sulphur be removed from the Leblanc certain profit accrue from its manipulation.

Speaking then generally, it may be said ammonia soda process the materials employed salt (partly as brine), carbonic acid, and lime, to small quantity of ammonia to supply the place is lost in its use; while in the improved Le there will be consumed salt, carbonic acid, a together with a small quantity of sulphur to sup of that which is lost. But only half as much lim as in the ammonia process, that portion serving the Parnell-Simpson process—once in the blacl and once as tank-waste in the ammonia column

Hitherto I have made no mention of the ar used in the respective processes. At present used by the Leblanc manufacturers exceeds those who conduct the ammonia process as 5 i latter figure, however, represents the amount of in a process which produces no chlorine. Now chlorine processes which have been referred t forming an adjunct to the ammonia-soda proces all such as will require considerable quantities o on this head there seems to be a fair probab balance will be redressed.

With regard to the cost of fuel, moreover, himself occupied in elaborating a system which tendency to lighten or remove the burden of tl coal from all consumers. He has constructed a from which so much ammonia is collected districts where coal is cheap almost the whol coal consumed, and which yields a gas incapab ing black smoke, and is perfectly suited to r operations. Mr. Mond enabled me to publish for 1886 as chief inspector under the Alkali, Regulation Act, the results of six months contin with this gas producer. To the details there give refer. They show that the amount of ammon twice as much as that collected in an ordinary the same quantity of coal.

These considerations go to show that the exc diture in the score of fuel in the Leblanc pro ammonia process will not ultimately remain.

There remains to be pointed out one centr which the Leblanc process has over any proc main operations are conducted on materials i

*mical Section of ber and, 1887.

It is the possession of the black-ash furnace, that nstrument in which the main work is accomplished. ratus so active that the one large revolver I have eferred to at the Widnes Alkali Work can convert onate of soda 60 tons of sulphate in twenty-four The total weight of ingredients operated on amount ns. An enormous mass of material to be dealt with nited area occupied by the furnace.

t is not in my power further to peer into the future. ief to represent the existing condition of this most g problem, how best to supply the world with soda ongeners. The forces enlisted seemed just now as lled for final conflict—the older and igneous against r and aqueous methods. To whom the final victory awarded, who shall say? We may, however, fairly t in this the centenary year of the Leblanc process, still stand firm in this his adopted country, and when rgy bred by long unrivalled success shall have olly dissipated, a fresh victory over his opponents await him.

e kind assistance of Mr. E. K. Muspratt, Hon. y to the Alkali Manufacturers' Association, I am to append a tabular statement of the amount of the products of the soda industry, annually produced year 1867 to 1886.

AL PRODUCTION OF ALKALI, ETC. IN UNITED KINGDOM.

Salt Decomposed.	Alkali, 48 per cent.		Soda Crystals.
	Leblanc Process.	Ammonia Process.	
578,201	217,556	6,220	169,769
568,542	196,876	11,116	170,872
615,287	230,683	15,526	185,319
700,016	266,093	18,800	192,926
675,099	238,687	20,400	203,773
679,935	233,213	39,000	180,846
795,732	227,284	52,750	188,678
690,502	204,072	61,480	182,567
722,472	184,597	77,530	202,705
713,112	165,782	85,000	182,379

Caustic Soda.	Bleaching Powder.*	Bicarbonate of Soda.	Total.
74,663	105,529	12,109	1,164,047
84,612	105,044	11,756	1,148,818
86,511	115,290	13,083	1,126,699
106,384	131,606	13,539	1,429,364
108,310	135,826	12,853	1,394,948
116,864	135,170	14,115	1,399,143
119,929	141,868	13,609	1,452,188
141,639	128,651	14,576	1,423,487
144,954	132,761	15,179	1,480,198
153,884	136,234	15,083	1,454,465

* Includes chlorate of potash, taking 5 tons of bleaching powder of chlorate. The amount of chlorate now made is 7,000 tons

STRIKE IN THE OIL TRADE.—At a largely attended g of the Scottish Mineral Oil Association held in the er of Commerce, Glasgow, it was reported that the on strike in the oil trade had arranged to resume t the full reduction, excepting those of the Broxburn ny. The object of their men being kept out was plained, viz., that the Broxburn Company is to be ttled," and should they be beaten by these tactics, e other Companies are to be attacked singly. The Oil Association, in pursuance of former resolutions, ve definitely arranged to support the Broxburn ny, and give them every assistance.

SPECIAL NOTICE.

THE favour already accorded to **The Chemical Trade Journal** is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, **the Organ** of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

DAVIS & CO.,

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As an **advertising medium** *The Chemical Trade Journal* occupies quite a unique position, it being the **only weekly Journal** exclusively devoted to the commercial aspect of chemistry and cognate industries. The Journal circulates amongst

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Paint and Varnish Manufacturers.
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Gas Engineers.
Sellers of Residual Products.
Colliery Proprietors.
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Brewers.
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Sugar and Starch Manufacturers.
Drysalters.
Salt Manufacturers and Merchants.
Alkali Manufacturers.
Chemical Merchants, Brokers, & Agents.
Brick and Tile Makers.
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Cement Manufacturers.
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Makers of Fine Chemicals.
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It will thus be seen that *The Chemical Trade Journal* offers unusual facilities for bringing trade announcements under the notice of a large and important class of buyers, and when it is added that the tariff for advertisements is not an expensive one, the advantages of this department of the Journal will be apparent to all those who seek to extend their business by that indispensable aid to nineteenth century enterprise and success, viz., **judicious advertising.**

Correspondence.

THE SUGAR BEET.

To the Editor of the Chemical Trade Journal.

Sir,—It must be near twenty years ago since the first genuine attempt was made in England to grow the Silesian beet root for the extraction of sugar. The then most enterprising and successful sugar refiner in the country expended a large sum of money in buildings and machinery at Lavenham, supplied the finest plants to the farmers, and offered to make contracts with them to purchase the whole of the sugar beet crops in the district, at a price remunerative to the agriculturists. It was pointed out that employment could be given to farm labourers, during the autumn and winter months, in the sugar manufactory, after field labour had ceased for the season. This was the report that was made after two or three years' unsatisfactory working:—The farmers would not take the trouble to keep the beets covered with earth (it is well known that the portion of the beet exposed to sun and air does not contain sufficient saccharine to work profitably), and the peasantry put stones in the cutting machines, which destroyed them. After some years' unsatisfactory work, the projector abandoned the enterprise. I have in my possession a sample of the beet sugar of commerce, made in England.—

Yours, etc., BEN-MORE.

THE CRISIS IN THE SCOTCH OIL TRADE.

An extraordinary meeting of the shareholders of the Broxburn Oil Company Limited was held in Glasgow last week, to consider the creation of new preference capital to the extent of £100,000.—The Chairman explained that this was necessary on account of the crisis through which the Scotch oil industry is passing, and as a consequence of which the shares of the Broxburn and other companies have been enormously depreciated. It had been said that the directors should have issued the proposed new stock in prosperous times, but the profit would have been taken out of the pockets of the shareholders. In the past they reaped the benefit of the Company borrowing at 3½ and 4 per cent. while a dividend of 25 per cent. was paid. The state of trade was now altered, and as the money with which they carried on their business was principally borrowed on deposit, and might be called up at times varying from one to four months, the directors did not think it right that their property should be at the mercy of such a contingency. On the new capital being subscribed the Company would be in a better position than it had ever been so far as financial matters were concerned, and he was glad to say their general prospects were improving for some of their products.—The creation of the new capital was agreed to, the rate of dividend being 6 per cent. and cumulative.—The Managing Director then made a statement with regard to the strike of the Company's miners, which has now lasted twelve weeks. The rate of pay had been gradually advanced from 1s. 4d. to 2s. per ton. The severe competition at home and the increased imports from America caused such a serious reduction in prices that something had to be done to improve the position of affairs, and at the last annual meetings of all the oil companies the shareholders expressed a strong opinion that some combined action should be taken in that direction. This took two shapes—an attempt to increase the value of the products, and also to reduce the cost of production. The leading companies, so far as the wages question was concerned, came to the conclusion that a reduction of one-sixth should be made from the miners' pay and 10 per cent. from other workmen. The latter acquiesced in the reduction, but the miners of all the companies struck work against the reduced pay, which still amounted to 5s. per day. Only the Broxburn Company's men still held out, and they had been taken in hand by the Trade Councils of Glasgow and Edinburgh, who ought to have satisfied themselves as to the worth of the men's complaint before taking up their case. The workmen of the other companies, he said, were now supporting the Broxburn men on strike.—Bailie Richmond asked whether the directors of the Company wished to sit tamely by and allow the Broxburn Company to be boycotted; whether they were to be supported by the Mineral Oil Association, or to be left to fight the battle alone?—The Managing Director replied that the Mineral Oil Association had undertaken to support any company boycotted by the workmen, and he expected they would keep their promise.—Bailie Richmond then moved a vote of confidence in the directors as regarded their dealings with the men on strike, and another shareholder, in seconding the motion, asked whether there was no possibility of turning the workmen out of their houses, which belonged to the Company. Probably the directors had been too indulgent. He would have them all turned out.—The Chairman: You have expressed the feeling of the directors. There is a little delicacy about being harsh with the men, but now that it has come to this pass, that we are boycotted thoroughly, we wish to take the opinion of the shareholders as to what we ought to do. We have been lenient. We have been going on from day to day and from week to week in the hope that the men would recommence work. But if you say we should put them out, then we shall do so.—Mr. Stirrat: Suppose we are to get support from the Mineral Oil Association, will that not be as satisfactory as if the miners were at work? Will we not get a share of the profits of the other works?—The Chairman: A standing work is not a paying work either for masters or men.—Mr. Stirrat: We wont be boycotted out of existence.—The Chairman: Oh, no. We have a quantity of shale, and we are reducing our stock at the rate of 500 tons a day.—Mr. Stirrat: How are they to assist us?—The Managing Director: That is to be arranged yet. Only last week we had a conference, and there is to be another meeting this afternoon at which they will state what they are to do. Unless they support us it will be a very serious thing for us. My own idea is that they are prepared to take the burden of one half of the work. We have a stock of 45,000 tons of shale, which will keep us going for eighty days at the rate of 500 tons a day. We want the members of the Association to provide the other half, and I hope it will be done in the shape of shale or crude oil, or a money payment.—Mr. Stirrat: Are you to allow these men to sit still and snap their fingers at you?—The Managing Director: There are some sixty men in the houses, and they are the ringleaders of the movement. So long as they retain possession of the houses, and live as comfortably as ever they did in their lives, they will prevent other men from coming about the works.—Mr. Hunt: In that case I would move that they be turned out.—Mr. Roughhead: I think it is a good thing for the meeting to strengthen the hands of the directors, but I would leave it in their hands, because Mr. Kennedy and the directors are far better able to deal with the matter than we are.—The Chairman: Do you second the motion?—Mr. Roughhead: No.—Mr. Stirrat said he would do so, as the Company must have possession of the houses at once.—Bailie Richmond: I think it is a mistake to tie the hands of the directors, and to bind them to turn out the men. I think you should rest satisfied with leaving the matter in the hands of the directors, with full powers.—The Chairman: We have the power, but we want the support of the meeting. Mr. Roughhead: I understand that a distinct resolution was made that the men should be turned out.—The Chairman: It will be well to have a distinct thing to go upon. If you don't object we will let it stand.—Mr. Roughhead: If the miners know that we have expressed an opinion so strongly it might have an effect upon them.—The motion was then put to the meeting and carried.

Notes and Queries.

Indian Produce.—The Indian Government (says a Simla telegram of the 25th ult.) is making arrangements for the free distribution of Indian tea, coffee, and tobacco to the visitors at the Grand International Exhibition of Arts and Sciences to be held at Brussels in 1888.

IRES.—The lead and colour works of Messrs. Hirst and k, at Hull, have been burned down. Had it not been a good supply of water, and the effective work of the e and volunteer fire brigades, many workmen's houses a large brewery adjoining would have also been royed, Shortly after 5 a.m. a large iron tank containing entine exploded with a tremendous report. The flames e ultimately got under, but the damage is considerable. e also broke out in a two-story building at Lancaster used oil-boiling purposes by Messrs. Williamson, and was not dued until the structure had been practically destroyed.

A NEW EXPLOSIVE.—There is no end to the perfectly olical competition of the military Powers of Europe in the covery of new chemical agents for the destruction of nkind. It is reported that the Russian Minister for War just concluded a series of experiments of a new explosive mpound which bids fair to outdo the qualities of melinite, urite, and all other explosives whatever in its application ll the present uses of gunpowder. This new and murderous mposition is destined, say many persons, to revolutionise existing system of ammunition. The new explosive is discovery of a Russian engineer, and has been christened stover. Its strength is equal to that of pyroxyline, and it the immense advantage of being ten times cheaper than nary villainous saltpetre. Another great superiority ch it possesses over all the known explosives of the mite class is that when fired its force does not strike nward, but entirely in a forward direction, so that it can sed for all the purposes of cannon and musket charges to ch ordinary gunpowder is now applied without any age whatever to the weapon from which it is discharged. stated, in fact, that ball cartridges loaded with it have fired out of cardboard barrels as a test without the least y to the latter. So satisfactory indeed have been the riments that it is reported the Minister of War is about ave a special factory built for its manufacture. The position of the new compound is of course, a deep secret.

REVIVAL OF TRADE.—The directors of Messrs. Sadler Co. (Limited), chemical manufacturers, Middlesbrough elsewhere, have issued their report and balance-sheet for year ending June 30th, 1887. The year's work shows a s profit of £10,213, which, after deducting interest ges, directors and auditors' fees, and depreciation, leaves t profit of £2,187.

ADULTERATION OF TOBACCO.—In the House of Commons Goschen said that the number of English tobacco manufacturers who had been found in possession of tobacco taining more than 35 per cent. of moisture was 51. The ber in Scotland was 8, in Ireland 12. They had all n cautioned.

TERRIBLE DEATH OF A STEEPLE JACK.—On Friday, 23rd ult., an inquest was held at Brinton touching the th of John James Bell. The deceased was employed at ssrs. Brunner, Mond and Co.'s Winnington Chemical rks, and, whilst engaged on a tower in fastening some cle, he missed his foothold, and fell head foremost, a ance of seventy feet. Midway his head went against e scaffolding, and his brains were dashed out. A verdict ccidental death was returned.

ANOTHER ACCIDENT.—A sad accident occurred within outskirts of Manchester, on Saturday, the 17th ult. About 30 a labourer named William Deighton, employed by ssrs. J. T. Bellhouse and Co., was engaged at some crubbers" at the works of Messrs. Hardman and Co., wton Heath, when by some means or other at present known he lost his balance and fell to the ground, a distance about thirty feet, alighting on his head, and when picked he was quiet unconscious. It was deemed advisable to move him to the Royal Infirmary, but before reaching that itution he succumbed to his injuries.

ANOTHER PETROLEUM WELL.—From St. Petersburgh are informed that a new petroleum spring, which rose yards in height, has flooded the whole country at akhan, near Baku, impregnating everything. Nobody tures to light a fire, as the slightest imprudence might se a catastrophe.

LECTURES ON AGRICULTURE.—A course of lectures on agriculture will be given at the City of London College, Moorfields, on Tuesday evenings, by Mr. Bernard Dyer, B.Sc., F.C.S., F.L.S., beginning on October 4 and ending in May. The lectures will treat of soils, plant life, manures, tillage operations, live stock, dairying, food, etc. Students are eligible to compete for the Lubbock Scholarship of £10, the Mitchell Science Studentship, and numerous college and other prizes. The Saddlers' Guild also offers a prize of £5. 5s. to the student who passes the best examination in chemistry and agriculture. —It is satisfactory to learn also that agriculture and agricultural chemistry are included in the subjects to be taught in future in the Glasgow Technical College. Mr. Charles J. Ellis, F.C.S., is to be the chemical instructor, and Mr. R. Wright, Fellow of the Highland Agricultural Society, will conduct the agricultural class.

INDIGO.—The indigo brokers' estimate for the crop in Bengal this season amounts to 20,300, maunds, against 23,353 last year.

GIANT POWDER.—An American telegram states that a railway collision has occurred near Wilkesbarre between two goods trains. One had four cars laden with giant powder, which exploded, blowing everything into fragments. Several trainmen were killed and injured. Another collision occurred near Springfield, Ohio, and caused a car laden with dynamite to explode with terrific force, the explosion firing some petroleum cars. Two men were killed, and the trains were destroyed.

AN OLD MILL CLOSED.—The paper mill of Messrs. Towgood Bros., at St. Neots, was closed on October 5th, when about 400 hands were thrown out of employment. In this mill was erected the second or third paper machine for use in this country.

A TECHNICAL SCHOOL FOR PRESTON.—Last week, at a meeting of the executive of the operative cotton spinners' Executive of Preston and district, it was resolved to memorialise the Corporation to grant, out of the Corporation funds, the sum of £10,000 towards the provision of a technical school for Preston. The Corporation has already decided to provide a site, and the Harris trustees have granted £30,000 for the school.

THE PROPOSED TECHNICAL SCHOOL FOR BLACKBURN.—Last week a meeting of the cotton spinners of Blackburn was held to consider what action should be adopted with regard to the proposed technical school for Blackburn. A resolution was passed approving of the proposal, and pledging the meeting to support it to the best of its ability. The proposed technical school is estimated to cost £25,000, towards which about £11,000 has been promised.

TOBACCO CULTURE AT BLACKHEATH.—During the past summer Mr. R. Stirling, of The Nursery, Morden Hill, near Blackheath, has successfully reared a capital crop of tobacco, having about an eighth of an acre in cultivation. Of the varieties he has grown those known as Big Frederick, Maryland Broadleaf, Kentucky, and Connecticut, have done remarkably well, the first-named in particular, but he has not been so successful with the varieties known as White Burleigh and Yellow Prior. The plantation was damaged by the hailstorm of the 17th of August, and the high winds of late have not been favourable to it, but still it is now in good condition. The leaves, many of which are 30 inches long and 14 broad, are just beginning to mottle, and the work of gathering will be commenced in eight or ten days for forwarding to market. Mr. Stirling's success, thus far, this year has led him to determine to cultivate a larger area with tobacco next year.

COPPER SMELTING.—The fourth general meeting of the Cloncurry Copper and Smelting Company Limited was held in Glasgow recently. Mr. G. R. Vernon, M.P., who presided, moved the adoption of the annual report, expressing regret at the unsatisfactory state of the company's affairs, but stating that, under all the circumstances, the shareholders had every reason to be hopeful. An amendment that the report be not adopted was, after considerable discussion, w[illegible]rawn. It was agreed that £15,000 should be raised on [illegible] on the security of the property of the company.

A New Gun and Projectile.—The new American air gun, constructed to fire nitro-glycerine shells, has now been practically tested, and it has proved equal to the most sanguine expectations of those interested in its success. A charge containing fifty-five pounds of nitro-glycerine, discharged without smoke or noise, would sink the largest ironclad afloat at a range of a mile and a half. The policy, therefore, of building more ironclads till something further is learned respecting this terribly destructive new armament, may well be doubted. The extensive adoption of that weapon would revolutionise naval warfare.

How the Taxpayers' Money goes.—The mysterious movements of a certain steamer which has been seen from time to time passing out of the Thames some distance beyond the Nore Light, lying-to for a while and then returning up stream, have been a source of curiosity to the river population, but may now be explained. The ship is a War Department vessel; and her work has been the destruction of gunpowder. For years past immense quantities of old powder, collected from obsolete shells or returned from war-stations as perished, deteriorated, or unreliable, have accumulated in the magazines at Purfleet. Efforts have been made to dispose of the condemned, but still powerful explosive, and it has remained on hand longer than desirable in the hope of finding a market for it. Sufficient saltpetre might have been extracted from it to pay expenses, but the hazardous process which this would have involved acted as an effectual deterrent to speculators, and the Government officials were in no mood to make an experiment which would be attended with no advantage commensurate with the risk. Accordingly, the sanction of the Secretary of State was obtained for the destruction, and it has been taken out to sea, many tons of it at each journey, and thrown overboard.

Terrible Explosion: a Vessel Destroyed.—Particulars have been received at Liverpool of an explosion which resulted in the destruction of the vessel War Eagle, at Boston, on the 8th ult. The War Eagle was loaded with a cargo of naphtha, and on the morning of the 8th she was discharging the naphtha into the storehouses on the wharf. A longshore man named O'Donnell went into the hold to assist in the unloading, and soon afterwards a terrific explosion was heard. The deck of the vessel was sent bodily into the air, and the next instant the vessel was a mass of flames from bow to stern. Owing to the inflammable nature of the cargo the fire spread with extraordinary rapidity, reaching the outbuildings, storehouses, and the laboratories and buildings connected with them. There was no hope of saving any of these places, and in a very short time they were a heap of ruins. The cook, a man named Moran, was in the galley at the time of the explosion, and he was blown to pieces. O'Donnell was blown into the air, and his body has not been found up to the present time. The other members of the crew had miraculous escapes, but Captain Philpott and the mate were badly injured. In the vicinity of the wharf is the old bridge. The Chelsea end was saved, but the Boston end was destroyed. It was estimated that by the fire and the explosion damage to the extent of nearly £100,000 was done.

A Serious Charge.—Before the Coleford magistrates the other day a boy of ten years, in a ragged and destitute condition, was charged with sleeping in an outhouse at the Whitecroft Chemical Works.

Unlawful Storage of Explosives in Lincolnshire. At the Spalding Petty Sessions last week, Messrs. Howard, Reffelle and Co., carrying on business at Peterborough and Crowland, were charged with having on their Crowland premises, 12lb. of gunpowder loose in an open bag, also with having 20 gallons of benzoline in an unlicensed shed. The Superintendent of Police considered the premises in a most dangerous condition. Defendants were fined for similar offences a short time ago. On this occasion they were fined 30s., the costs, and the benzoline and gunpowder, value 30s., were forfeited.

Suicide.—Mr. Joseph Unsworth, one of the largest oil merchants in North Staffordshire, committed suicide by hanging himself last week. The unfortunate man is said to have been greatly distressed of late, owing to business reverse the

Gunpowder Explosion.—A terrible explosion has taken place at the Gunpowder Factory at Felixdorf, near Vienna. Twelve men were killed, and the building was wrecked.

The Treatment of Sewage at Wolverhampton.—A special meeting of the Wolverhampton Town Council was held on the 29th ult., the Mayor (Alderman Jackson) presiding.—Alderman F. D. Gibbons moved that the tender of Mr. Henry Holloway, of Wolverhampton, be accepted for the separate system of drainage for the Whitmore Reans district, at a sum of £2,296, in accordance with the plans and specifications prepared by the borough surveyor. He said that under ordinary circumstances a town, through which ran a large river, was best sewered by the gravitation of the sewage, after the water had been separated, to land of a suitable area. But Wolverhampton, besides being exceptionally situated, was a manufacturing town, from which were drained large quantities of deleterious acids. In order to deal with such refuse, it was necessary not only to run by the separate system the water into the ordinary channels, but also to use the precipitation process at the outfall. This system was universally approved by the most eminent and accomplished sanitary engineers of the present day. Such approval, he thought, was quite sufficient to support their ideas without going to the expense of having the special opinion of an expert.

Oil for Vancouver.—The Standard Oil Company have erected a warehouse at Vancouver, and intend making that place the basis for supplying British Columbia with their oils.

New Illuminant.—A number of gentlemen interested in illuminating agents witnessed an exhibition of a new light last week at the Messrs. Milne's works, Abbeyhill, Edinburgh. The light bears the name of "the hydrophotogene," and is the invention of Mr. William Wells, chemical manufacturer, Leith. In many respects it resembles the Lucigen light, now largely used for the illumination of yards and workshops. The mechanism, however, is simple and the oil different. The oil is forced up the chamber by means of water, the ordinary street pressure being amply sufficient for this purpose, although Mr. Wells provides the apparatus with a crank. When the oil passes into the combustion chamber it is transformed into an inflammable vapour, which, with a mixture of air, produces a white but warm light of considerable brilliance. The oil Mr. Wells uses is that black tar-like liquid which ironmasters have difficulty in finding a market for. Its cost is something like 1d. per gallon, and with one gallon the inventor claims that he can keep a light equal to 2,000 candles for two hours. The whole mechanism can readily be moved from place to place, and is complete in itself. The exhibition was very successful, although the light showed a certain unsteadiness, which will have to be avoided. The different objects around the yard were rendered quite distinct in the very dark night. There were no shadows, but a brilliance almost similar to that of ordinary coal-gas.

River Plate Fresh Meat Co.—The annual meeting of the River Plate Fresh Meat Company was held recently in London. The profit and loss account to the 30th of April showed a debit balance of £24,132. 14s., which added to the depreciation in value of the company's steamers and machinery, make a total of £42,021. 15s. 4d. The report was adopted.

An Exhibition of Illuminants and Naphtha Products was opened at St. Petersburg on August 27. Several prizes are offered, open to foreigners as well as Russians. Two rewards are offered by the Ministry of Imperial Domains, one of 2,500 roubles for a cheap lamp of simple construction, in which the heavy unrefined naphtha oil could be burned and which might be used in the poorer villages, and one of 1,000 roubles for a lamp of better construction to burn the same oil. The Ministry of War offers three prizes of 500 roubles each—the first for a stove for room-heating, in which naphtha refuse could be burned; the second for a useful but cheap galvanic battery for electric lighting; and the third for phosphoric substances to be used in illuminating. The exhibition remains open until November 15.

ST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

et as a whole has not gained ground, and some ceptibly weaker. If anxiety there is in any ngs more around good forward terms for rather ries than upon mere spot bargaining, which for quite destitute of activity. Bleaching powder ins last quotations, and caustic soda is the turn hate of ammonia continues locally undecided ctory, its varying quotations, as put on report, h more ground than is ordinarily the case, and by any means as yet overplentiful in producers ean of value is probably a shade lower than it ago. Paraffin chemicals retain late firmness, ks being very low and the labour strike not ued, although the remnant of it is very poorly romising to succumb. Works are fully resumed, urn, which, however, gets more into form every iters from the strikers' ranks return to duty. and its market position still occupy the deliber- Scottish Mineral Oil Association at its frequent Glasgow, and it is understood that the arrange- allied makers for the contemplated permanent forward, and of encouraging promise. The tions are :—Soda crystals, 46s. 6d. net Tyne; 7s. 6d., net Glasgow; borax, English refined, boracic acid, £46, net Glasgow; soda-ash, less 10 °/₀ Tyne; caustic soda, white, 76°, 72°, £7. 10s., and cream, 60/62°, £6. 5s., Liverpool; bicarbonate of soda, 5 cwt. casks, cwt. casks, £6. 5s., net Tyne; refined alkali, 6 °/₀ Tyne; salt-cake, 23s. 6d.; bleaching 12s. 6d. to £7. 15s., less 5 °/₀ Glasgow; of potash, 4½d., and of soda, 3½d., less 5 °/₀ trate of soda, 9s.; chlorate of potash, 6d., sulphate of ammonia (nominal), £11. 5s. to Leith; paraffin scale, 1⅜d. to 2¼d.; paraffin ined, 120°, 2½d. to 2¾d.; naphtha, 7d. to 8d.; opper, £13. 13s. 9d., less 5 °/₀ Liverpool. Clyde veek include 44,665 bags and 500 barrels sugar, rites of copper, 224 bags of asbestos, 223 barrels o barrels oxide of zinc.

HE TAR PRODUCTS MARKET.

If anything, is a shade weaker, but it is only case of 50/90, which is value to-day for 2s.; in price owing to the demand being equal to ut the large make of tar now commences, and ways produces about three times as much tar as taneously with this large production comes the will be poured into the market from the Stoke- trict, but which will not appear before the turn Despite certain contradictions as to quantities be made, issued to the trade last week by rties, we again assert we are correct, and the f others misleading. Carbolic acid and anthra- m, but pitch is in as sick a state as ever.

SULPHATE OF AMMONIA MARKET.

s of ammonia has been quiet all the week, but vilences to-day that makers are willing to take s. Hull is being sold at £11. 7s. 6d. to Leith at £11. 5s. to £11. 7s. 6d.; while quoted at £11. 15s. The market is dull for very.

rpool gas-water has just been let again for a ee years, and with the exception of that made at has been secured again by Messrs. Brunner, o., of Northwich, so that this will keep a very ty of sulphate of ammonia *out of the* market, another *three years*.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

12946. WILLIAM GUEST, TOM GUEST, GEORGE GUEST, and ARTHUR GUEST. For an invention to take the waste gases from coke-ovens to fire boilers and light works, and to make shale and waste dirt into oxide of iron and calcine and creosote oil. September 24.

13004. WILLIAM PHILLIPS THOMPSON. A communication from Sebastian Wolf, of Germany. For improvements in or connected with the application or utilisation of acid sulphate of soda in the manufacture of cellulose and for other purposes. September 26.

13047. JAMES WALLACE PATON. For a new or improved cleansing powder or compound. September 27.

13048. JAMES BEVERIDGE. For improvements in the manufacture of sulphuric acid. September 27.

13064. PERCY BATESON and MATHIAS CHRISTIAN ARNHOLTZ. For improvements in or connected with the manufacture of carbonate of soda from the bicarbonate of soda made by the ammonia-soda process. September 27.

13085. WILLIAM PHILLIPS THOMPSON. A communication from La Société Industrielle des Glycerine et acides gars of France. For improvements in the treatment and distillation of fatty acids, and in apparatus therefor. September 27.

13088. BENJAMIN WILLCOX. A communication from Farbenfabriken vormals Friedr. Bayer and Co., of Germany. For improvements in the manufacture of methylenchloride. September 27.

COMPLETE SPECIFICATIONS ACCEPTED.

8348. JOHN HAMMOND. For improvements in the method of and in apparatus for, the complete purification of coal-gas by concentrated liquid ammonia, and the recovery of sulphur and ammonia for the manufacture of sulphuric acid and sulphate of ammonia. June 24, 1886.

13998. FREDERICK MONTAGUE EDWARD PIZEY. For improvements in metallic and other receptacles for holding alimentary and other substances. November 1, 1886.

14875. JOHN RICHARDSON FRANCIS and FREDERICK FRANCIS JONES. For an improved process and apparatus for obtaining sulphur and other substances from ores, for purifying such substances and for similar purposes. November 16, 1886.

15240. OWEN BOWEN and JOHN COBELDICK. For an improved deodorising, decolourising, and filtering medium. November 23, 1886.

15308. CLARENCE WILLIAM CROSSLEY. For improved apparatus for the separation, extraction, and amalgamation of metals. November 24, 1886.

448. EDMUND EDWARDS. A communication from Rudolf Sjöberg, of Sweden. For a new or improved explosive. January 11, 1887.

9122. JULIUS FRIEDRICH FERDINAND FRANZ LOWE. For an improved process of manufacturing white lead. June 27, 1887.

10655. EUGÈNE TURPIN. For improvements in the production of explosives. August 2, 1887.

10667. EUGÈNE TURPIN. For improvements in explosives. August 2, 1887.

11500. CARL JOHANN EUGEN DE HAËN. For improvements in the manufacture and application of the compounds of fluoride of antimony with the chlorides or sulphates of sodium, potassium, or ammonium. August 23, 1887.

11610. JOHN EBENEZER WARREN and FRANCIS AUGUSTUS CLOUDMAN. For improvements in means or apparatus for use in effecting the recovery of chemicals from spent liquors of pulp digesters. Aug. 26, 1887.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. at maker's works, or at usual ports of shipment in U.K. The prices in localities may vary.

		£	s.	d.
ACIDS:—				
,, Acetic, 25 °/₀	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6⅞
,, Arsenic	per cwt.	0	12	9
,, Chromic °/₀	per lb.	0	0	4¼
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.	per bottle	0	0	6
,, ,, (cylinder) 30° Tw.	,,	0	2	9
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4½
,, Sulphuric (fuming 40 °/₀)	per ton	12	0	0
,, ,, (Brimstone 168°)	,,	4	5	0
,, ,, (Pyrites 168°)	,,	3	7	6
,, ,, (spent oxide 168°)	,,	3	17	6
,, ,, (,, 150°)	,,	2	5	0
,, ,, (Pyrites 150°)	,,	2	0	0
,, Tartaric	per lb.	0	1	7
Arsenic, white powdered	per ton	10	12	6
Alum	,,	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3½
,, = 24°	,,	0	0	1¾
,, Carbonate	,,	0	0	3½
,, Muriate	per ton	22	0	0
,, ,, (sal-ammoniac)	per cwt.	34/- & 32/-		
,, Sulphate (grey), London	per ton	11	16	3
,, ,, (grey), Hull	,,	11	7	6
Aniline Oil	per lb.	0	0	9¾
,, Salt	,,	0	0	8¼
Antimony	per ton	35	0	0
,, (tartar emetic)	per lb.	0	1	0
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	4	0	0
,, Sulphate (native levigated)	,,	3	5	0
Bleaching Powder, 35 °/₀	,,	7	7	6
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	12	5	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 °/₀ f.o.b. London,	per unit per cwt	0	1	3
Benzol, 90 °/₀ ,,	per gallon	0	2	8
,, 50 °/₀ ,,	,,	0	2	0
Carbolic Acid (crystallised 35°)	per lb.	0	1	2
,, (crude 60°)	per gallon	0	3	9
Creosote (ordinary)	,,	0	0	1½
,, (filtered for Lucigen light)	,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	1	3
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston	,,	0	13	6
Coke-oven Oils (crude)	per gallon	0	0	[illegible]
,, (distilled)	,,	0	0	[illegible]
Copper (Chili bars)	per ton	39	15	[illegible]
,, Sulphate	,,	13	1[illegible]	
,, Oxide (copper scales)	[illegible]	[illegible]		
Glue	[illegible]			
Glycerine (crude)	[illegible]			
,, (refined)	[illegible]			
Iron (turnings)	[illegible]			
,, Peroxide (blue billy)	[illegible]			
,, ,, (bog ochre)	[illegible]			
,, ,, (precipitated	[illegible]			
,, Sulphate (copperas)	[illegible]			
,, Sulphide (antimony slag)	[illegible]			
Lead (sheet) for cash	[illegible]			
,, Acetate (white)	[illegible]			
,, ,, (brown	[illegible]			
,, *Nitrate*	[illegible]			

Lime, Acetate (brown)	per ton
,, ,, (grey)	,,
Magnesium (ribbon and wire)	per oz.
,, Chloride	per ton
,, Carbonate	per cwt.
,, Hydrate	,,
,, Sulphate (Epsom Salts)	per ton
Manganese Sulphate	,,
,, Borate	per cwt.
,, Ore, 70 °/₀	per ton
Methylated Spirit, 60° O.P.	per gallon
Naphtha (Wood), Solvent	,,
,, ,, Miscible, 60° O.P.	,,
OILS:—Castor	per cwt.
Cotton-seed	per ton
Linseed	,,
Lubricating, Scotch, 885°—890°	,,
Petroleum, Russian	per gallon
,, American	,,
Silver (metal)	per oz.
,, Nitrate	,,
STARCHES:—	
Sago	per cwt.
Potato (farina)	,,
Sodium (metal)	per lb.
,, Carb. (refined Soda-ash) 48 °/₀	per ton
,, ,, (Caustic Soda-ash) 48 °/₀	,,
,, ,, (Carb. Soda-ash) 48 °/₀	,,
,, ,, (Soda Crystals)	,,
,, ,, (Crystal Carbonate)	,,
,, Chlorate	per lb.
,, Borate (Borax)	per cwt.
,, Bichromate	per lb.
,, Hydrate (74 °/₀ Caustic Soda)	per ton
,, ,, (70 °/₀ Caustic Soda)	,,
,, ,, (60 °/₀ Caustic Soda, white)	,,
,, ,, (60 °/₀ Caustic Soda, cream)	,,
,, Bicarbonate	,,
,, Hyposulphite	,,
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.
,, Silicate (glass)	per ton
,, ,, (liquid, 100° Tw.)	,,
,, Sulphate (Salt-cake)	,,
,, ,, (Glauber's Salts)	,,
,, Sulphite	,,
Potas[illegible]	per oz.
[illegible]	per lb.
[illegible]	per cwt.
[illegible]	per lb.
[illegible]	per ton
[illegible]	,,
[illegible]	,,
[illegible]	per cwt.
[illegible]	,,
[illegible]	per lb.
[illegible]	,,
[illegible]	per ton
[illegible]	,,
[illegible]	,,
[illegible]	,,
[illegible]	,,
[illegible]	per lb.
[illegible]	per ton
[illegible]	,,

The Chemical Trade Journal,

SATURDAY, OCTOBER 15, 1887.

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THE PRESENT AND FUTURE OF BENZOL.

In our article on the future of the Benzol Market (see *ante* p. 113) we put before our readers a plain statement of fact: there was nothing very startling to the producers of benzol who had been alive to the necessity of watching carefully all that was going on around them with regard to new developments of the benzol business. How comes it to pass then that the whole Association of Tar Distillers were as much concerned as if a thunderbolt had fallen in their midst, verily a hawk in the pigeon-cote could have not produced more consternation? This is why: When benzol was first produced as a substantive article by the various processes now known as carbonisation, its price was certainly not less than ten shillings per gallon. As the various carbonising works gradually got under weigh, so did the price of benzol decline, until in October of 1886, just one year ago, the value had sunk to as low a figure as 1s. 5d. per gallon delivered free on board at Goole, casks free. At that time we had several conversations with some of the leading tar distillers of the country, and learned with regret that the tar distillers, one and all, attributed the fall in the price of benzol to the serious quantity put upon the market from these sources. Carbonisers always held different views, they held—whether rightly or wrongly—that the fall in value resulted from the action of certain speculators, who, as early as the middle of the year 1884 filled up all available orders from the consumers for the greater part of the year 1885, so that when the carbonisers, when makers outside the ring wished to dispose of their production there was no outlet *for it*. So low prices ruled, and *despite the fact that three* out of the five carbonisation works were stopped last year, and that very little was known outside of certain circles of what the others were doing, purchasers both in this country and abroad were certainly not aware of how the situation actually rested. In fact, amongst many tar distillers it had become the fashion to talk of carbonisation as a failure, though there were works actually in full operation at the time. So completely had tar distillers deceived themselves on this point that the information in our article on the future of benzol regarding the Stoke-on-Trent district broke upon them like a thunder-clap, and caused some of their leaders to wield their pen, an instrument they do not seem to be familiar with, to attempt to retain amongst themselves those antiquated ideas we have already characterised as erroneous and delusive.

One of these letters appeared in the pages of our valued contemporary *The Journal of Gas Lighting*, but the inaccuracy of the statements contained therein has now become notorious by the corection furnished in the next week's issue by Mr. Henry Simon. The ignorance of the writer was clearly shown in supposing that the benzol produced from other sources than coal-tar emanated from the Simon-Carvès ovens. There is no doubt some is produced in this way, but it is a mere drop in the ocean compared with that produced in a well-organised carbonisation works. The letter from "an Old Tar Distiller" is a much more sensible communication, and did space permit we should much like to reply, but we fear that such a proceeding would have a tendency to depress the market.

We had the desire to let the matter remain as we had left it. Certainly we have no desire to see benzol fall to the extent experienced last year, though we believe that no amount of writing-up will avert the inevitable depression. Still, the more we write and the more we put facts and opinions before the thinking portion of the community, the sooner they will see that if the arguments which were used at the commencement of carbonisation were correct, and they were not our arguments, they must remain good for to-day.

It is on this account only that we are tempted to reopen the subject again. An extraordinary effort has privately been made by interested parties to lead the trade to consider that our calculations have not been made with sufficient care; but as we feel that such opinions uncontroverted will be most prejudicial to the majority of tar distillers, and that most of the statements submitted to the editor of *The Journal of Gas Lighting* are incorrect, we feel bound to reply to the article on the "Present and Future of Benzol," which may be found on page 618 of *The Journal of Gas Lighting*.

In the first place, we may say it is now well known what transpired at the last meeting of the Tar Distillers' Association, and the opinions of the leading speakers there. We congratulate the members upon the extent of their faith in the future of benzol, and in the amount of credulity displayed in accepting without controversy the accuracy of some of the communications read to them. Let us hope they will not be disappointed.

We will now return to the article on page 618 of *The Journal of Gas Lighting*, dealing with the statements contained therein *seriatim;* but first of all we would point out to our readers the strange and significant fact that in the whole of the article alluded to, there is not one single figure adduced from an accurate basis to upset our calculations, or to lead the readers of it to form any opinion of their own; all we meet with are such broad assertions as "incorrectness of the figures," "the one-sided character of the communication," which can only be characterised as a very specious kind of argument. But what we have most to complain of is the false logic of the article, and last but not least, the attributing to us of certain figures which most decidedly we have never used.

INCORRECTNESS OF THE FIGURES.

In estimating the quantity of benzol, 90's and 50/90 produced from coal-tar, we took as our basis the annual production of 96,000,000 gallons, which not only we ourselves, but the leaders in the gas world also believe to be under the mark. We are rather surprised to be charged with "the one-

sided character of the communication" when 12 gallons per ton of coal is stated to be incorrect, instead of 10½ to 10¾ gallons as *The Journal of Gas Lighting* would have it. Let us look into this matter more closely:—In a paper read by Mr. Wright in 1886 before the London Section of the Society of Chemical Industry, he said: "We may fairly assume that the total quantity of tar going into distillers' hands is 97,175,000 gallons." Mr. Wright is the engineer of the Nottingham gasworks, and may be supposed to have understood what he was talking about; moreover, there were present to hear his paper, Mr. F. Livesey of the South Metropolitan Gas Co.; Mr. Norton Humphreys of Salisbury; Mr. H. E. Jones of the Commercial Gas Co.; Mr. G. C. Trewby of the Gas Light and Coke Co.; Mr. George Anderson the well-known consulting gas engineer, and others, and when Mr. Wright said "I shall take as the average yield throughout the United Kingdom the amount of 12·5 gallons of an average specific gravity of 1·185 per ton of coal carbonised," none of these eminent authorities attempted to disprove it. Furthermore, Mr. Wright said "there is practically no margin for any reduction in the output of tar by the employment of higher heats," so that as we know the production of coal-gas increases at the rate of between 4 and 5 per cent. per annum, the production of gas-tar in 1888 must be nearly 10 per cent. more than in 1886. To be on the safe side we took an increase of only 5 per cent., and we urge we were considerably under the mark in so doing.

With regard to the quantity of benzol produced by carbonisation we feel considerable delicacy in going into details; we are aware of the exact monthly quantities which have been delivered from some of the works; we know the number of retorts in operation, and have a very fair idea of what can be obtained per ton of coal; our answer to the charge of incorrectness is to challenge those carbonisers who were so ready to give returns for the benefit of the tar distillers to come forward and say how much they have sold for all next year. If they have considerably oversold themselves it does not seem that they have much faith in a rising market.

INSECURE ARGUMENTS.

So much for the second paragraph of the article, we may now deal with the third. At the outset we feel it necessary to premise that if benzol falls in value, the gas companies would not be so selfish as to expect the tar distillers alone to bear the loss; cheap benzol must mean cheap tar, and the main point of our article on page 113 was to point out to the producers of it what was likely to be the result so soon as the year turned, and to indicate a method whereby the disastrous results we can foresee must happen, might be averted. It is all very true to say that benzol productions must have a "regular sale;" but on the other hand there is not a regular production. If sales were in the habit of being made month by month only, at current rates, our article would not have been written. Does our contemporary intend us to believe that the consumption of benzol runs evenly with its production, and that the aniline colour makers work but little in summer and much in winter on account of the fluctuation in the supply of tar? The real fact is that the benzol market is easily "cornered" either for enhancement or depression, and the editor of *The Journal of Gas Lighting* explains why this is so. He says: "The producers on the other hand are not only very much more numerous, but, in many instances, are so circumstanced as not to be in a position to store benzol for lengthened periods."

Considering that tar-benzol constitutes at least two millions of gallons out of a total of two and a half millions, it clearly rests with the tar producers, *id est* the gas-makers, to take action. That some good may be done is clearly seen from the stand made last year against selling at any price by the Sheffield Gas Company. The tenders received averaged only 6s. per ton, and so the directors came to the conclusion that they would rather burn it all than sell it at such a figure; the engineer for a long time employed it for heating his retorts, and reported to his Board that he could make 12s. 6d. per ton out of it as fuel. When tar became more *scarce in the district it fetched* 15s. per ton, as benzol and anthracene had both risen in value. In direct opposition, therefore, to the conclusions of the third paragraph, we say that if tar distillers pay high prices for tar next year they will be losers; while, if they do not purchase, the gas companies in most instances will not lose if they employ it as fuel in situations and under such conditions as should yield a value equal to Sheffield, of 12s. 6d. per ton.

Another insecure line of argument followed in the fifth paragraph of the article already alluded to, is in supposing that "if the price of benzol is to fall to anything like the figures mentioned by Mr. Davis, it is certain that carbonisers cannot continue their operations." Against this proposition, we have the absolute fact that even when benzol was selling at 1s. 5d. per gallon, the largest carbonising works which has as yet been built was kept going at its full capacity. Some of those "private sources" from whom the information of *The Journal of Gas Lighting* has emanated must have known that another and the largest carbonisation works that this country has seen will soon be in operation, and they might have judged that the enormous amount of capital required for such an undertaking would not have been sunk without being very certain of a profitable return.

FALSE LOGIC.

We have endeavoured in our previous articles to show our readers that quite as much benzol will be produced in 1888 as in 1885, if not considerably more, and there has been no attempt to show any inaccuracy in our figures save the single instance with which we have sufficiently dealt. The article on "The Present and Future of Benzol" in our contemporary has not shown to what extent the consumption has "steadily increased." It is quite certain that this long, light, and warm summer has not caused a scarcity, for has not 90's benzol fallen from 3s. 7d. in July to 3s. before the date on which our first article appeared?

Upon reading the article in *The Journal of Gas Lighting*, one would be apt to consider that there were many carbonising works in existence. It may be interesting for our readers to know that they may be all counted on the fingers of one hand—the Whitwood Chemical Company, the Rockingham Gasworks and the carbonising works at Tamworth, and the new factory at Talk-o'th'-Hill, which will be the largest yet built. The three first are at work, and the fourth it is understood will be in operation in December, so that the statement, "a number of the works were in consequence closed, and there is no probability of their being re-opened, at all events this winter," seems to us not only inexplicable, but misleading. And reverting to the second paragraph again, and reading it in conjunction with the third and fourth, we can only draw one inference—that prices have not declined through over-production, but from the consternation produced by our inaccurate figures. We find, however, in the fifth paragraph these words: "But this is not the case with carbonisers who can and do cease their operations when the price of benzol is no longer remunerative to them. Some time ago many of them were imprudent in causing an over-production."

The logic of the seventh paragraph, if the subject were not so serious, would be amusing; it is well the writer alluded to is anonymous. Does he not see that the case he cites is not at all on a parallel with the production of benzol; instead of being apposite to his arguments it is the very reverse. For his information we may tell him that the benzol consumption is steady throughout the year, while the coal consumption meets only the exigencies of the hour. If the producer of coal raises more than is wanted during the summer months he wisely puts it into stock and waits for the winter consumption, whereas the editor of *The Journal of Gas Lighting* states that benzol producers "are so circumstanced as not to be in a position to store benzol for lengthened periods." If the production is irregular and the consumption regular, who stores it? Answer; the consumer, who buys sparingly when the supplies are scarce in the summer months, and takes all into stock which comes pouring in during the winter.

We cannot spare space in this number to go more fully

ils, and unless we are forced to take up our pen ill let the matter alone until next April, when we ainly review the past. We may now close this a reference to—

ERTAIN FIGURES WE HAVE NEVER USED.

rrespondent," says *The Journal of Gas Lighting*, g on the fundamental mistake in Mr. Davis's calcu- hat he has greatly overstated the quantity of benzol from one ton of coal," etc.—leads the editor to following remarks: "And now as to the bases on r. Davis founded his article and prophecy, and ut broadly, are that the yield of tar by gas com- d of benzol by carbonisers were both greatly over- e former being put at 12 gallons instead of 10½ to ons per ton of coal, *and the latter at 4 gallons.*" s are our own, and we may be allowed to say that never used these figures which are here attributed to e charge of over-statement rest on such a basis as re willing to allow it to remain in company with rrection for the mature consideration of our readers. ore point and we have done. Tar distillers are ated "on the fact that only last week a consider- act for the purchase of benzol was concluded at er gallon. If the editor of *The Journal of Gas* calls a sale of 2,000 gallons of 90's benzol a con- contract, we join with him in his congratulations, ubt many more sales will be made at this price e end of the year. We have not ventured to y opinion respecting values for this year. Until ends there will be no disturbing element, and the normal price should be obtained. We hope makers who are so very sanguine of the future of ll not be disappointed. When depressing times in they will be wishing they had not followed so e advice of those to whom it is not yet policy to eat out of the bag." If "there is at all events de to the dark prophecy," it may be the brightness nerally precedes the storm. We have said what say; to be forewarned is to be forearmed, and can see a silver lining to the dark cloud should be make their hay while the sun shines.

GAS-TAR AND ITS USES.

III. TAR AS FUEL.

last chapter we illustrated several devices used to sieve the tar between the store tank and the burner, eep away the small carbonised particles which are top up the small apertures in the nozzles of ordinary We have made very many inquiries as to the diffi- erienced in securing a small, even-running stream l we find that all those who have approached the ike the same complaint as to the liability to sudden by choking at the burner or behind the tap. Even nas' tar regulator we have received the following n Mr. George Lane, of Aylesbury:—"Consider- ulty in keeping a continuous and equal-running much improved by the use of Thomas' patent but still stops flowing occasionally."

seems to show that mere filtering at the burner, or een the store tank and the burner, is not sufficient. otherhithe Gasworks, where they have been very in the practical results of tar-burning, the tar is to a covered tank on the top of the retort beds, overflow pipe through which the excess of tar ows back into the tar well. In this tank there is a The tar then passes through another strainer to a ered tank on the top of the beds, in which is a k, controlled by a ball and lever. The tar flows ce through 2 inch pipes along the beds but not with the brickwork. From the 2 inch pipes, ver- ch tubes descend to every furnace, having a ½ inch a cap partially filled with a hardwood plug, the plug being drilled to receive a brass tube of about ⅛ in. internal diameter, and 6 in., 9 in., or 12 in. long, according to the degree of fluidity of the tar. The cock is left full open, and the desired quantity is regulated by length of tube. For very thick tars a tube as large as ½ inch in diameter may be required, in which case it will probably be found necessary to extend its length to several feet. In some cases the straight tubes are found to be, on the whole, better for the purpose than the bent tubes illustrated by fig 4, page 159.

The tar is delivered by the brass tube into a funnel tube, and thence discharged into an angle-iron shute carried through the front wall of the setting, just above the furnace frame, at a suitable inclination. This arrangement is for use with Mr. George Anderson's tar fireplace, or at least a slight modification of it, and is said to answer admirably the purpose of securing without fail, a continuous and even-running stream of tar when so little as four gallons per hour is being passed.

Mr. J. Light, of Dayton, U.S.A., described his method of screening the tar before use, and also of the arrangements he found necessary by reason of extremes of temperature, at the second annual meeting of the Ohio Gas Light Association. He said:—"I placed a tank, holding just three barrels, on the top of my benches; and on that tank, and connected with it, I placed a smaller cylinder, the latter being about 18 inches in diameter. On the inside of the cylinder I placed a screen, made in the form of a cone (the large end up), to receive the tar. The clear tar passed through this screen and into the tank, leaving the dirt and sediment on the meshes of the screen. Perhaps you may think that would be a difficult job to perform in case the tar was cold and thick; and so it would have been with me—for my screen was made out of very finely perforated sheets of tin—were it not for the fact that I placed steam jackets around the tar pipe, and heated the tar so as to cause it to run almost as freely as water would. My arrangement for elevating the tar into the delivery tank was a common hand force pump. The delivery pipe from the pump was 1 inch in diameter, and I ran it through a 2 inch pipe, in order to thus secure a steam jacket. When tar was needed in the delivery tank, steam was turned on and the pump set at work. Of course the tar, passing through the pipe encased in the steam jacket, flowed freely."

Mr. Thomas Bower, of West Hartlepool, describes the arrangements he has adopted and found effective in a paper which has already appeared some time ago in *The Journal of Gas Lighting*. Mr. Bower says:—"On the top of the bench is placed a wrought-iron cistern, with strainers fixed both at the inlet and outlet, into which the tar is pumped from the tar-well. The tar runs out some six inches above the bottom of the cistern through a 1½ in. wrought-iron pipe, reduced to ½ in., which passes on to the burner. Running alongside this pipe is a ¾ in. steam-pipe, reduced to ½ in., which also passes on to the burner. The furnaces are such as are used for coke, with the doors pushed back, and the front filled in with 9 in. brickwork, with an opening at the top about three inches square, through which to pass the burner. There is another aperture near the bottom, 9 in. by 6 in., and in this is placed a cast-iron frame with plug, into which is drilled four ¾ in. holes for the admission of air. This opening also serves for the purpose of clinkering, as, by the removal of the plug, any deposit which is formed in the furnace can easily be removed. The ash-pan is entirely filled up with ashes. The furnace doors and frames are left in position so that, should it be desired, a change can at any time be made from the use of tar to coke in a very few minutes, without any interruption of work, by simply pulling out the brick front." The foregoing instructions seem to us all that is necessary for those to follow who contemplate employing tar as fuel during the coming winter. This part of the operation, viz., that of filtration, will have to be thoroughly done, as if it is carelessly performed the gas manager may reckon on nothing but failure. It seems to us that in most systems we have either seen or heard of the screens have been too small, and the dirt and other matter which is sure to collect in time is not easy of removal at a moment's notice. This is a matter which requires attention.

(*To be continued.*)

HOW NEW PROCESSES ARE TREATED.

In another column will be found a case which is of considerable importance to the introducers of new processes. Some time ago the Mather-Thompson Bleaching Process was issued to the world as an improvement on the old method of bleaching, the time during which the goods are in process being materially shortened, and other benefits were supposed to arise from the introduction of the new system.

From a case heard at the Chorley Police Court on the 4th inst., it appears that the late managing director of the Standish Bleaching Company Limited, and a foreman in the employ of the same Company, were summoned on two charges—first, for unlawfully and maliciously damaging a quantity of cloth; and secondly, for committing wilful damage and injury to spoil five pieces of cotton cloth, the property of the Company. All this arose from the introduction of the Mather-Thompson system of bleaching. A reference to the report of the case on page 174 will show the details which came out during the hearing, and no doubt the defendants were very much astonished to find that the magistrates, on considering the case very fully, marked their sense of the heinousness of the crime by committing each defendant to gaol for one month with hard labour.

No doubt many persons will consider that such a sentence as this is a very hard one, but when they look at the other side of the question they will be apt to modify their conclusions. During the early days of a new process the inventors are fully occupied in working out the practical details; it often happens that they have spent large sums of money in preliminary experiments. They have given their time and their knowledge cheerfully to the working out of these details, expecting to benefit mankind and at the same time to receive a share of the spoils for themselves. Anyone who has had to do with the introduction of any process or system tending to revolutionise any existing state of things will know how much the poor inventor has to put up with, and it is hard enough for him to have to meet ordinary difficulties which crop up every day without having to face the little petty annoyances created by those unsympathetic with the new system, and even the conspiracies and dishonourable tactics such as have appeared to be present in this case connected with the Mather-Thompson process.

We are afraid that these conspiracies are not uncommon, and that almost every new process has the same thing to go through, not only on the part of foremen and others connected with the working of a system which perhaps they dislike; but also from others pecuniarily interested in the existing system, from which perhaps they draw as much baksheesh as they dare. And not only is it in the introduction of new processes that this feeling is allowed to dominate, but existing ones also have a fair share of this treatment. We have in our mind's eye a case in which the manager of an alkali works attempted to make some improvement which would yield to the revenue more than the system already employed. It was a simple change; under the old *regimé* the very best of the soda-ash manufactured was dissolved in water and set aside to crystalise. Prices were falling, and the manager endeavoured by selling the best ash, and taking the commoner discoloured article for the manufacture of crystals, to increase his revenue. Time after time did the crystals turn out badly, the foreman in charge of that department trying to get out of the difficulty by saying: "You will have to come back to the old plan again; you cannot expect me to make crystals from the skim milk after you have taken all the cream away." The manager was, however, determined to succeed, and in the course of his investigations he found the man in charge, while setting his syphon to draw off the clear liquor, put it right down into the red mud that had settled to the bottom of the settlers. Of course when this was found out a change was made in the administration of that department, and things went on well for ever after. To give another instance: A case also came to our knowledge in which the foreman of an oil refinery was refused a large percentage commission on the sulphuric acid which was used in his establishment. The matter was, however, soon put right for the point of his clog being driven through several bottles of vitriol per day, allowing it to run down the sough instead of going into the mixing tank, soon caused a heavy complaint from the owner that the vitriol was not right and would not purify the oil. We could multiply these instances to a very large extent were it necessary to do so, and it behoves all manufacturers to keep a careful watch on any new thing they are trying in order to see that it is not tampered with, and if any employé be found capable of doing or assisting to do any such dastardly trick as we have indicated an example should be made of him, so that if he ever seeks employment elsewhere his new masters will know with what sort of a man they have to deal.

TECHNICAL EDUCATION IN SOUTH STAFFORDSHIRE.

Within the memory of men now actually living, South Staffordshire held one of the first, if not the first, place among the iron-producing districts of the world. It was in this district that Dudley first successfully applied pit-coal for the production of iron, and during the last two centuries many important improvements in iron manufacture have originated in South Staffordshire. In the person of Mr. T. Oakes, of Dudley, the man is still living who, upwards of half a century ago, introduced the modern form of blast-furnace hearth, which at once produced an enormous increase in the production of each furnace. The older men in the trade remember how, upwards of thirty years ago, when Cleveland first began to be an iron-making district, the furnaces were built on the lines of those in use in Staffordshire, as representing the most advanced knowledge of the times, and many Staffordshire men were employed in the new works. Still more recently, in the Cumberland district, Staffordshire men were in much demand, and a traveller from the Black Country may often meet a familiar face in the neighbourhood of Barrow. But during the last thirty years, a great alteration has taken place in the relative positions of the iron-producing districts of this kingdom, and everybody knows that the change has not been favourable to the interests of Staffordshire. It is usual to ascribe this alteration in the state of affairs to differences in rates of transit, to the relatively higher price of native ores, and to the influence of the modern development of steel manufacture. Doubtless all these things have an important bearing on local trade; but there are also others which are not without influence, and in which the deficiencies may be more readily repaired. All who are familiar with the iron trade are aware that enormous advances have been made both in the amount of production and quality of material during the last thirty years, and yet during that period very few indeed of these advances have originated in this neighbourhood. Or, in other words, Staffordshire, which fifty years ago was taking the lead in one of the most important branches of manufacture, has during the last thirty years been content for the most part to follow tardily in the wake of the younger districts. The reason of this is not difficult to find; for while the newer districts have availed themselves of the latest improvements, and employed many trained chemists, metallurgists, and engineers, Staffordshire has been content to follow steadily in the old and beaten paths. During recent years Cleveland, Cumberland, Scotland, and South Wales have each produced leading spirits in various branches of iron manufacture, and have in consequence reaped the advantages of the introduction of new processes. Staffordshire stands almost alone in having produced no such leaders, in having originated no processes destined to revolutionise the industry, in having enlisted the services of few men of science. In other districts trained chemists are to be found at all the best works; while in Staffordshire, until quite recently, a trained chemist was almost unknown. But during the last few years signs of progress have appeared in this important direction. Already some of the largest establishments have trained analysts regularly employed, and whenever modern processes have been introduced this is found to be indispensable. An important change, too, is to be observed in the attitude of the

and others engaged in directing the works of the r, while a few years ago these were generally imparting information, and were unwilling to adopt ions, an institute has now been formed, and has ne excellent work in providing the members with nformation. The South Staffordshire Institute of Steel Works Managers numbers about 200 members, hem being most of the managers and other higher the works in the district. By the reading of papers ar meetings during the winter, and the circulation nt matter among its members, a spirit of scientific fostered, and the latest information is rendered ttainable. Recently arrangements have been made uthorities of Mason College, Birmingham, for the classes in chemistry and metallurgy for members tute, and these promise to be a success. In view hings, coupled with extended elementary instruc- quipment of a good metallurgical laboratory at the nstitute, and the teaching of technical science at a local institutes throughout South Staffordshire, we rmitted to take a somewhat more hopeful view of of the iron trade of the district. Certainly times very bad, and the period of depression unusually if chemical knowledge take the place of ignorance, methods and processes replace the worn-out proce- f a century ago, and if a spirit of co-operation and ry replaces the old jealous secrecy, we may still South Staffordshire, in some branches of the iron ast, if it does not again occupy its former leading nay at all events, hold its own.

STRATFORD-ON-AVON SEWAGE FARM.

STICE CHARLES, sitting as vacation judge in the Division, had before him last week the motion, from the 14th ultimo, for an interim injunction in of Thompson *v.* the Mayor and Corporation of n-Avon, instituted in the court of Mr. Justice Mr. Marten, Q.C., with whom was Mr. Brenton he brief of Mr. Bramwell Davis) appeared for am Thompson, and asked for an injunction the defendants, the Mayor, aldermen, and bur- the borough of Stratford-on-Avon, till the trial of or further order, from using or permitting to be ce of land on the south side of the East and West Railway, and in the neighbourhood of land of the situated at the corner of Evesham-road and eet, as a sewage farm or otherwise, so as to cause to the plaintiff or his tenants, or from causing or noxious vapours or smells to escape from the land them. The plaintiff's house, No. 37, Evesham- pied a triangular piece of ground on the north side n-road and the south side of Sanctus-street. The purchased by him in 1871, and he built his house years afterwards. In April, 1881, he purchased on the southern side of it, containing about 11½ the purpose of laying it out for building; but at was occupied partly for agricultural purposes and ravel pits. The sewage farm was a strip of land 20 acres in extent, the pumping station erected on 79 yards from the plaintiff's land, and 400 yards house. There were eight filtering beds. The commenced in June, 1885, and on the 22nd of the plaint was made by the plaintiff by letter of the which he was subjected. That was followed by lers and memorials, and promises were made of t. Reports were made as to the measures by nuisance could be prevented, and a screening, or clarifying tank had recently been erected; but, diminishing the nuisance, it had greatly increased was ample evidence to show the extremely nd dangerous character of the vapours, and there circumstances which tended greatly to aggravate in this particular case. Stratford-upon-Avon, tinguished in history, did not *appear to have been* successful hitherto in drainage works, and the sewage had until lately been collected in cesspools. The result was that the present system did not merely carry off fresh drainage, but tapped receptacles for old sewage, and therefore deposited upon the sewage farm drainage in a highly concentrated form and of a particularly bad character. In the second place, it appeared that there were brewers carrying on a large business at Stratford-on-Avon, and they turned into the sewers refuse from their brewery at a high temperature, the effect of which was to promote decomposition of other sewage. From these causes the sewage was in such a condition when it reached the farm as to cover the land with a gelatinous film, which prevented the sewage from filtering through the earth. All that the Corporation had done up to the present time had in no way relieved the plaintiff from the intolerable nuisance under which he suffered; and as far as could be gathered from the evidence there was no substantial denial of its existence, the only defence, apparently, being that a great deal had been done towards mitigating it. The defendants also represented that if their works were stopped they would have again to turn the sewage into the river Avon, and thus expose themselves to complaints from other sources, and that the rates being high they would not be justified in incurring heavy expenses. It was clear, therefore, that the Corporation would take no steps unless compelled by the strong arm of the law.—Mr. Lathom, Q.C., and Mr. Baker, for the defendants, read evidence to show that until the sewage farm was undertaken, the Corporation were constantly receiving complaints from landowners of the nuisance caused by the discharge of the sewage into the river, and that the site had been selected and the works erected in accordance with the recommendation of Mr. Bailey Denton. —Mr. Justice Charles: Do you deny the existence of the nuisance in your affidavit at all? Mr. Lathom said the evidence went to show that the Corporation were doing all that they could do to remove all ground of complaint, and that the process of diminution of the nuisance was going on. That there was stench in 1886 they could not deny; but measures had since been adopted which many witnesses swore had to a great extent mitigated the evil, and there were other works in progress which would entirely remove it.—When all the evidence had been read, and Mr. Marten, Q.C., had argued the case in support of the motion, Mr. Justice Charles, without calling upon Mr. Lathom, gave judgment. He was not satisfied by the evidence that the case was one in which an interim injunction ought to be granted. If he said anything further he was afraid he might prejudice one party or the other at the hearing, and he therefore thought it enough to say that, having regard to the balance of convenience and inconvenience, he had come to the conclusion that he ought not to grant an interim injunction. There would be no order on the motion, except that the costs of both parties would be costs in the action.

NEW FORMS OF MILK ADULTERATION.

(From the *British Medical Journal.*)

A NEW form of adulteration is likely before long to engage the attention of milk analysts and magistrates; indeed, we can only explain the fact that no prosecutions have as yet been undertaken on the supposition that grave doubts are entertained as to the probability of bringing this form of fraud within the letter of the existing Sale of Foods and Drugs Act. We allude to the rapidly increasing employment of so-called milk preservatives, with advertisements of which—sometimes occupying an entire page—the trade journals at present teem. They are not used by the great milk companies, nor, we have reason to believe, by farmers, at least to any extent; but they do undoubtedly find a ready sale among the smaller retail dealers. The explanation of the favourable reception they have met with is not far to seek; the yield of milk of any number of cows varies with the weather almost from day to day, and a dealer must regulate his minimum supply by the maximum demand likely to be made upon him by his customers. He thus,

bleaching, for which purpose five pieces of calico wer
to Messrs. Chadwick and Co.'s, of Chadderton. I
course the pieces were returned to Standish, and
discovered in the process of dyeing the pieces that the
sprinkled with spots, and the material fell out where
was a spot. There was suspicion of foul play but it
not be found out. Subsequently twenty other pieces
sent to Messrs. Chadwick, in charge of Mr. A. H. Tu
company's chemist, to undergo the patent bleaching pr
and the pieces being watched, came out all right. Mr.
left the company in July, and then it transpired that a
named Charles McDonnell had, about the 9th May,
Greenhalgh saturate a rag with some chemical, and th
into the grey room, where the five pieces of cloth wer
in the presence of Mr. Coupe, the director, sprinkle the
in question. It was also proved by Thomas Taylo
company's "townsman," that Mr. Coupe asked h
sprinkle the second lot of calico with a chemical aft
bleaching, but he refused.—Mr. Richardson plead
extenuation.—Colonel Silvester, the chairman of the
said they had considered the case very fully and to mar
sense of the heinousness of the crime they, without the
of a fine, committed each defendant to gaol for one
with hard labour. Mr. Richardson urged the bench to
a fine, but the magistrates declined.

Correspondence.

NON-POISONOUS WHITE LEAD.

To the Editor of the Chemical Trade Journal.

Dear Sir,—We notice that in your reference to our
in the number of *The Chemical Trade Journal* of th
September, you say we exhibit a kiosk painted wi
patent non-poisonous white lead, "which *is said* t
been subjected to the action of volatile sulphur fumes."
must ask you kindly to correct this statement in a
issue, as on reference to the catalogue of the Exhibitio
our pamphlet, circulars, etc., you will find that w
made no such statement. There are also exhibited spe
which have been so acted upon, but the kiosk most ce
has not been so treated. There is also a board ex
which had been painted half with the best ordinary
white lead and half with our patent lead, and hung
three months at Gower-street Station on the London
ground Railway, showing the practical effect of a s
laden atmosphere on the two pigments. We enclose
board which has been immersed in sulphuretted hy
gas, showing the relative action of that gas on th
pigments.

After very careful trial the District Railway have a
this pigment for use on the ceilings of their carria
account of its retaining its colour in that excessively s
laden atmosphere, where ordinary white lead turns the
of brown paper in a couple of months.

We think the perusal of the accompanying pape
convince you that the production of this pigment m
new and very important departure in colour manufac
specially worthy of the attention of chemical exper
reviewers. We are, etc.,

London, Oct. 4, 1887. J. B. FREEMAN

A NEW PATENT GAS.—The Dalton-in-Furness
Board at their last meeting decided to adopt the ga
under the patents of Mr. Hugh Williams, C.E., of
Andrews and Company Limited, engineers, Reddish
chester, for lighting their district. The plant consis
producer, gasholder, and carburetter. The prod
similar to a small gasholder and tank. The tank
with dilute sulphuric acid; and on a perforated tray
the holder scrap iron is placed. The hydrogen g
generated is conveyed by a pipe into the carburetter
it enters into combination with one of the tar oils, and
into the service-pipes as a highly luminant carb
hydrogen gas.

SPECIAL NOTICE.

THE favour already accorded to **The Chemical Trade urnal** is of a very encouraging character, and proves yond doubt that the Journal supplies a distinct want in the mical and allied trades.

It will be the constant aim of the proprietors so to increase r usefulness of the Journal, as to make it *par excellence*, e **Organ** of the numerous and important industries in ose behalf it was established, and they will at all times be d to receive from subscribers information and suggestions th a view to its improvement.

The proprietors beg to intimate that the Publishing Office been removed to more central and convenient premises, d they have to request that all communications in future be dressed to

DAVIS & CO.,

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2, JOHN DALTON STREET, MANCHESTER.

As an **advertising medium** *The Chemical Trade urnal* occupies quite a unique position, it being the **only eekly Journal** exclusively devoted to the commercial pect of chemistry and cognate industries. The Journal culates amongst

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Tar Distillers.
Paint and Varnish Manufacturers.
Soap Makers.
Gas Engineers.
Sellers of Residual Products.
Colliery Proprietors.
Lime Burners.
Brewers.
Distillers.
Sugar and Starch Manufacturers.
Drysalters.
Salt Manufacturers and Merchants.
Alkali Manufacturers.
Chemical Merchants, Brokers, & Agents.
Brick and Tile Makers.
Glass Manufacturers.
Cement Manufacturers.
Chemical Engineers.
Manufacturers of Chemical Plant and Appliances.
Metallurgists.
Manure Manufacturers.
Makers of Fine Chemicals.
Analytical Chemists, &c., &c., &c.

It will thus be seen that *The Chemical Trade Journal* offers nual facilities for bringing trade announcements under the tice of a large and important class of buyers, and when it added that the tariff for advertisements is not an expensive e, the advantages of this department of the Journal will be parent to all those who seek to extend their business by it indispensable aid to nineteenth century enterprise and cess, viz., **judicious advertising.**

JOINT STOCK COMPANIES.

IMPORTANT PROPOSAL.

THE *Globe* states that early next session a bill for the amending of the defects of the Limited Liability Acts will be introduced by the Secretary to the Board of Trade, and the measure will include an entire revision of the existing regulations for the registration of public companies. No Company is to be registered unless a certain modicum of its capital has been actually subscribed, and every company so registered will be required to file a copy of its half-yearly balance-sheet for the inspection of the public. Under the present *regimé* neither of these important points is insisted on. All that is required prior to the registration being that seven individuals whose names and addresses must be given have become shareholders. As a matter of fact frequently it happens that seven individuals, each of whom holds one £1 share in a new undertaking, can register a company with a capital of as many hundred thousand or million pounds as they please. It appears that 64 per cent. of all the companies registered at Somerset House are unsuccessful, and exist only until they are wound-up within a few months of their birth. Innumerable companies, without the vestige of a chance of ultimate prosperity, are often framed with the most utopian or unpractical objects. For instance, the Common Fund Company, an American undertaking, was registered in London as having a capital of one hundred millions sterling, and eventually obtained a subscribed capital of only £200. Other companies are started from time to time with extraordinary, not to say ludicrous aims. The number of joint-stock companies annually registered at Somerset House is very great and increasing. In 1863 the first complete year after the passing of the Companies Act, the number was 790; in 1873 it was 1,241; in 1883, 1,766; while 1885 shows a decrease, the total being only 1,482. This retrograde is, however, more than compensated for in the return for 1886, which is not yet published which shows a grand total of 1,891, being 130 more than in any previous year. Mr. Purcell, Registrar of the Joint-Stock Companies, estimates that, out of 1,440 companies registered in 1883, with a nominal capital of £144,000,000, 430 did not proceed beyond the mere registration; while 160 more, with a paid-up capital of £4,500,000 are wound-up, or in process of being wound-up. The balance of 850 companies, with a capital of thirty-two millions, are still carrying on business. The total number of companies registered is 26,000 since 1856, while the number actually carrying on business at the present moment is 9,300.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

XV. GROUP VIII.—METALLURGY.

THE exhibits under the head of Metallurgy at the Manchester Royal Jubilee Exhibition are extremely interesting, showing as they do some of the various finer metallurgical processes which are at work in this country. Under the head of raw material we may classify the exhibits of the Abram Coal Company, of Bickershaw, near Wigan; the coal and coke of Messrs. Platt Brothers Limited, of Oldham; and the products exhibited by the Astley and Tyldesley Coal and Salt Company Limited. The Abram Coal Company show some good specimens of their new Boghead cannel, cannel nuts, and Arley gas coal, which are largely used in the Manchester district for gas-making purposes. They also show specimens of the Wigan 5ft. coal, 4ft. coal, and 6ft. coal, and a specimen of the Abram Main coal.

Messrs. Platt Brothers Limited show samples of the Mountain Mine coal, and coke made from the washed smudge. This firm are also brick makers, and the exhibit contains some very good specimens of machine made bricks, and of close fire-bricks made from pit shale and clay ground together.

The Astley and Tyldesley Company show also some specimens of gas coal, and samples of their speciality—the great 7ft. bakers' coal.

In the iron industry is exhibited the results of the Thomas-Gilchrist basic process, by means of which a very good quality of iron is made from ores containing large percentages of phosphorus. Phosphorus is extracted by means of the basic lining, and transformed into phosphate of lime. This is a process which has been attemped by many inventors, but no one before Messrs. Thomas and Gilchrist have been able to make the process a commercial success; not only have they been able to send a good pig-iron into the market, made from indifferent ores, but they are also able to supply agriculturists with large quantities of a useful fertiliser. In connection with this exhibit, No. 800, we must treat of that shown at Stand 812, which has been sent by the College of Agriculture, at Downton, near Salisbury. Here is shown a chart exhibiting the effects of basic cinder when used as a fertiliser; samples are shown before disintegration as well as after disintegration, and it is well that all agriculturists and manure merchants should take special note of these products. Already a large trade is being done by exporting this basic slag to Germany, but it only requires to be better known to our agriculturists at home to be generally used here. We have for a long time been deluging our land with a very acid superphosphate, and no doubt there is sufficient lime in the soil to stand a very great deal more of such treatment, but although the phosphate of lime thus applied to the soil is becoming a very cheap manure, it is quite certain it can never hold its own with basic slag. This basic slag only requires to be presented to the soil in a very finely divided state, and we understand that machinery has been put down in one or two districts to supply the demand for it, which has now reached considerable proportions. We are sure our farmers need only to give this new manure a trial in order to prove its usefulness.

Two other exhibits of very great interest at the present moment are those of the Cowles Electric Smelting and Aluminium Company, at Stand 801, and the Webster's Patent Aluminium Crown Metal Company, at Stand 807. Aluminium, on account of its lightness and capability of resisting a tarnishing atmosphere, has always been a metal finding great favour with inventors. Whether it will ever be made cheap enough on a large scale is a matter which time only can show, but it is certain, by the numerous patents which have been taken out recently, that inventors have not given up the problem of producing it in large quantities. There are, no doubt, many important applications for it, both in the pure state and also when mixed with other metals in the form of alloys, and the exhibit at Stand 807 shows us very clearly that there is a considerable outlet in many directions, even at its present price. The methods by which aluminium is now prepared are somewhat expensive and intricate, and we shall watch with great interest the development of the Cowles Electric Furnace in its application to the reduction of this metal.

One of the most interesting exhibits in this group is that of the Magnesium Metal Company at Patricroft. Many of our readers will recollect the old establishment erected in Salford, which was later on removed to Patricroft and the operations considerably extended, and the extraction of other metals carried on at the same time. The development of this Company is in a great measure due to the energies of Mr. Samuel Mellor, who has shown much ingenuity in dealing with the metals, which were at the time of his first commencing the business only to be found in the laboratories of schools and colleges, and made to order by certain conti-
ental firms whenever they were required. Sodium, potas-
um, and magnesium are some of the metals made at
tricroft, and specimens of them are to be seen in the case
hibited by this Com
manufactured by
ll is in connectio
time largely us
oduction of a
les which
lium for
to manu
the proc

Bismuth and antimony are
haps the greatest interest
nufacture of vanadiates, at
printers of England for
order to overcome the
ction of such a metal
inters, Mr. Mellor
which was neces-
e has worked a

novel process for the production of hydrochlorate of
of special quality for use in the production of anilin
Interesting to the analytical chemist is a sample
caustic soda, which is made from metallic sodium, a
a product of extreme purity. At one time—we do n
whether it is so now—the Magnesium Metal Compa
the sole makers of this article, and for purposes of
its purity is such that no other preparation can vie
This Company are also smelters of gold and silver,
of which are shown by them, as well as samples of
from which these metals are extracted.

At Stand 810 Messrs. Henry Wiggin and Co., of B
ham, show a series of preparations of nickel and co
which they are famous, together with specimens of
from which these metals have been extracted. N
largely used in the preparation of German silver a
white metals, and specimens are also shown of these,
the raw state, and as ship fittings, bar fittings,
furniture, and carriage fittings; and cast anodes o
and cobalt, such as are used for nickel and cobalt
form another portion of the exhibit.

Amongst the heavy metals we have the exhibit of
Walker, Parker and Co., of Chester, of lead ore, le
products of the above, which they manufacture. A
809 the Mostyn Coal and Iron Company exhib
departure from the ordinary method of iron smelting
country. Samples of spiegel, ferromanganese, silicic
and ferrochromium are shown by them, together with
samples of manganese.

Many of the materials and products obtained in th
facture of Bessemer pig, spiegel, etc., are shown
811 by the West Cumberland Iron and Steel C
Limited, who also show a good collection of ste
plates, and sundry steel castings.

As illustrating the copper industry, or rather that
of it by which poor copper ores are treated by
Extraction Process, Mr. Duncan McKechnie, of St.
shows the raw materials and the gradually worked
ducts in the following order:—Spanish pyrites, burnt
purple ore, copper precipitate, sulphate of copper
copper; while in the same case may be found a
specimens showing the extraction of silver and
Claudet's process.

Messrs. James Smith, of Manchester, have a Stand
in which the process of gold-leaf manufacture is ex
and this seems to be one of the most popular of the
to be judged by the number of visitors who are alw
crowding round.

We cannot close this notice without reference
exhibit of Messrs. Johnson, Matthey and Co., of
who exhibit a platinum apparatus for the concent
sulphuric acid. The old method of rectifying v
glasses has, by many firms, been given up, as it is
be much less economical than the rectification in p
Moreover, the old process takes up considerably mo
than the platinum still, so that, in erecting a new w
this purpose, manufacturers as a rule have preferred
capital expenditure in plant, than to employ a pr
liable to mishaps by breakage of glasses, and so apt
annoyance to neighbours as the old method, though
outlay for plant is considerably less than when pla
employed.

(To be continued.)

THE RUSSIAN SUGAR INDUSTRY.

The export of loaf and fine sugar from Russia, Transcaucasian country is considerably on the incre would have increased to a far greater extent if tolerab were only made in Persia. A first rate metalled roa being built on the Russian side, but on the Persian th not dreamed of commencing one, although it was ag set to work simultaneously. As a result of this the converted in transit into a mass of small crumbs mix sand and dirt. Cases are broken and sugar cones

ommercial men hope that the road will be taken to but it is evident that should this ever come off it e soon. Until quite lately Russian sugar was taken only in the shape of small cones of refined sugar. rt was carried out by a Kiev firm which has now in establishing its agents in Persia, and in organ- business on a very fairly firm footing. At the me experiments are being carried out in the export n moist sugar there. The firm commencing this hat of Zactzovo, which exports sugar for the manu- who signed the agreement concerning obligatory The present prices of Russian sugar in Persia are low, while the transport rates are high. The result that, in spite of the premiums established for sugar through the eastern frontier, its profit on its sale in es not exceed that obtained on the same article sold uropean markets. Nevertheless, the possibility of a good market for the sale of sugar in Persia is the most serious attention of Russian exporters, having established relations with the Persian are determined to keep up and develop them. e that, with the prolongation of the Transcaspian the cost of transport will be considerably reduced."

A NEW PATENT GAS.

ther column may be found a short description of a nt gas, which, it is stated, is to be adopted at -Furness. The new gas is stated to be of the illumi- ower of 65 candles, which is four times the power esent Dalton gas. *The Journal of Gas Lighting*, of r 20th, says that a deputation of the Dalton Local ited the works of Messrs. Andrews in August last, the gas in use both for lighting and motive power, esenting their report to the Board it was adopted.

not know whether the Dalton-in-Furness Local ve gone carefully into the cost of this new gas, but at we can see of it the scheme promises to be an luxury. A thousand cubic feet of hydrogen gas early six pounds, and if produced by the action of acid upon scrap-iron will require for its formation han 168 lb. of scrap-iron and 288 lb. of real oil of Taking the former at the market value of 35s. per gas will cost for iron alone 2s. 5d. per thousand , and with vitriol at 40s. per ton, at least 5s. per cubic feet for acid. It is also on record that a gas from light petroleum spirit in the way indicated in requires four gallons per thousand cubic feet to 8-candle gas, or for 65-candle gas at least twelve ould be wanted. At 8d. per gallon this means 8s. that, without reckoning the cost of labour, the of distribution, or anything for interest on capital, iation, the cost of the gas cannot be less than—

	s.	d.
For iron	2	5
,, acid	5	0
,, carburetting oils	8	0
	15	5 per 1,000 cubic feet.

e argued that a valuable by-product, viz., copperas, btained, but our experience of a works running of tons away annually rather than have the expense ing and finding a market for it, does not lead us to hat there is any prospect of such being done.

ogen is wanted in large quantities it can be prepared h cheaper manner than by the action of sulphuric n iron, but we doubt whether an illuminating gas such a process will ever be able to successfully with coal-gas so far as price is concerned.

LOTHIAN OIL COMPANY.—We understand that ies existing in the Board of the West Lothian Oil Limited have been practically adjusted, and that ors have arranged and settled with Mr. D. G. Hoey n terms.

THE HISTORY OF SOME CHEMICAL PROCESSES.

I. MANGANESE RECOVERY.

(Concluded from page 153.)

WHEN the Weldon process was being pushed in 1873 by its promoters, the cost of making bleaching powder by its aid was then stated to be per ton :—

	£	s.	d.
Fuel, 15¼ cwt. @ 9s. 10d.	0	6	10½
Oxidiser lime, 11¾ cwt. @ 18s. 6d.	0	9	10½
Powder lime, 11½ cwt. @ 20s.	0	11	6
Limestone dust, 6¼ cwt. @ 10s.	0	3	3
Manganese, 1¼ cwt. 70 °/₀ @ 130s.	0	8	1½
Wages	0	17	8½
Casks	0	17	1
	£3	14	5

To which must be added repairs, depreciation, and all capital charges. The wages and material for repairs should not come to more than 10s. per ton of bleach, so that substituting present values for raw materials, bleaching powder could be sold at a profit at £4. 4s., provided the acid be given in free; but as we know that acid costs something, at least to condense, the difference between £4. 4s. and the selling price, £7. 4s., is the price realised for the acid used in the process. A ton of salt should yield practically forty bottles or two tons of acid at 28° Tw., and reckoning that a ton of bleach is made from 50 cwt. of salt, this is equal to a consumption of five tons of liquid acid at 28° Tw. This, when worked into bleach by the Weldon process, realises £3 sterling, giving the price per ton as 12s., or per bottle, 7d. It is probable, however, that in many works more than five tons of acid of 28° Tw. are required per ton of bleach made, so that the price charged for "tower salts" now ruling in Widnes and Runcorn, viz., 6d. per carboy at the works in buyers' carboys, is a very fair charge.

We have before us now some figures kindly communicated for the purposes of this article, showing the quantities of raw materials employed in the process as carried on to-day, and which bears out the statement made in one of our former articles, that there has not been any material improvement in manganese recovery since 1873. At the same time, one is able to calculate what bleaching powder is costing to make at the present day :—

Salt decomposed	2,594	tons.
Native manganese 70 °/₀	44	,,
Limestone dust	141	,,
Lime	877	,,
Fuel	640	,,
Total bleaching powder made	802	,,

We have now devoted enough space to the details of the processes for manganese recovery, all of which save one have never met with universal application. The reduction of the value of native manganese, caused by the lessened demand for chemical purposes, has taken a considerable amount of the sting out of all recovery processes, and it may be taken for granted that the chemical demand no longer rules the price. The demand for manganese ore is for metallurgical work, such as the making of spiegel and ferromanganese, and for this purpose a protoxide is much more valuable than a raw material of higher oxidation. It is therefore probable that if the bleaching powder manufacture becomes extended, trials will be made of processes yielding as a by-product a consolidated protoxide instead of a regenerated peroxide, as in such a case but little plant would be required as compared with the present recovery system. The still liquor might be neutralised with limestone to precipitate phosphates and iron and afterwards precipitated with lime, the precipitate of protoxide of manganese being filter-pressed and semi-fused by heating in a reverberatory furnace or cupola.

There is one good thing the recovery of manganese from the residues of bleaching powder making has effected, viz., the diminution of the pollution of our rivers and water-courses. In 1874, when Messrs. Crossfield's works were in operation at St. Helens, bleaching powder was made by the

old process, the waste still liquors being run into the canal, the water of which was once analysed with the following results, the samples being collected three times a day for a week :—

	Parts per million.
Free hydrochloric acid	876
Total solid residue	3,632
Suspended matters	9
Chlorine (total)	2,174
Manganese (Mn)	152
Sulphate of lime	794
Nitrogen as nitrates	2
Ammonia	2

By adding about half an ounce of lime to a cubic foot of this water a precipitate of protoxide of manganese was obtained, weighing, when dried, about a quarter of an ounce It was pretty well time that such a source of pollution was stopped, as most watercourses in the vicinity of bleaching powder works were similarly affected.

Notes and Queries.

A Monster Nugget.—The *Sydney Morning Herald* says a 225oz. nugget has been unearthed by Chinamen at Hargraves, near Mudgee. The Celestials endeavoured to keep the matter quiet; but as the nugget was transmitted to the Mint direct through Chinese agents, the news of the find soon leaked out. It was at Hargraves in the year 1852 that the celebrated Carr nugget of 1 cwt. was found, and very recently a 460 oz. nugget was found a few miles away, at the Maitland bar. The effect of these rich finds will be to give an impetus to prospecting in this district.

Electric Lighting.—At the meeting of the Iron and Steel Institute in Manchester, Professor Fleming read a paper in which he advocated electric lighting in works and factories. He referred to the great strides already made with the system of lighting, and predicted its ultimate general use. Several members who have adopted electricity in their works spoke of its advantages. Before the meeting separated an invitation was received to visit America next autumn, and the president said the council would give full consideration to the matter.

Restriction of Output.—The coal miners of Scotland seem bent on the restriction of the output. A large representative gathering has decided to adopt a "ten days a fortnight" policy. Much of the Scotch coal is used by the ironmasters direct, and thus, if the policy be generally adopted, there may be some effect on both the iron and coal trades soon. It remains to be seen, however, whether some miners will carry out the views expressed to the extent of terminating the contracts which they entered into when the last advance was conceded — eleven days' work in the fortnight.

Personal.—We understand that Mr. James C. Stevenson, M.P. for South Shields, and Mr. H. Beckett, of this city, have joined the Board of the Tharsis Copper and Sulphur Company, to fill the vacancies created by the death of Mr. William Williamson, of South Shields, and by the retiral of Mr. William Galbraith, of Glasgow.

Saccharine.—A supply of saccharine has at length reached the London market, though in small quantities and at a high price. The body, which is a white powder with a strong sweet taste, and a faintly bitter after-flavour, is said to have a sweetening power 300 times greater than that of sugar.

Broxburn Oil Company.—On Monday last forty-three men occupying cottages as tenants of the Broxburn Oil Company were, with their families, evicted from their dwellings. For some weeks past a strike against a reduction of wages has existed amongst the Company's workpeople.

Winding-up of a Public Company.—*Connah's Quay Alkali Company Limited.*—Meeting, Thomas Wade, Guthrie, and Co.'s, 71, King-street, Manchester, October 25th, at three o'clock, for an account of the winding-up.

Tribunals of Commerce.—The Midland Merchants' Traders' Association and the Nottingham Chamber of Commerce are making a united effort to secure the institution of tribunals of commerce with a legal judge and commercial assessor.

Gold Mining.—The gold-fever shows no signs of abating in South Africa. The product is very small, and there are many blanks in the claims, but it is the marvellous success of some mines, such as the "Sheba," which keep up the excitement. The original £1 shares of this Company have been as high as £100, and are now being dealt in at £40.

The Lucigen Light.—This system, a Glasgow invention, is said to be on the point of taking the field systematically under the auspices of a wealthy syndicate, of London formation. The matter attracts attention in the trade, and good things are hoped from a new lighting expedient whose basis is the consumption of shale products in large quantities.

The Broxburn Oil Company.—The resolution of the Mineral Oil Trade Association to support the Broxburn Oil Company during the continuance of the strike of the miners has not yet, says our Glasgow correspondent, had any effect upon the workmen. It is believed, however, that they will now soon return to their work, looking to the new aspect of affairs. In the event of the strike being prolonged, it is understood that the directors of the company will take advantage of the powers conferred upon them by the shareholders at Wednesday's meeting, and proceed at once to carry out the long-threatened evictions. The shares of the company were firm yesterday, on its becoming known that the associated companies will support the Broxburn Company. This support will take the form of 500 tons per day of shale, or its equivalent in crude oil.

The Manufacture of Ice.—A new industry is about to be started at Cardiff for the manufacture of ice, and for the erection of cold storage rooms. This industry owes its start here to the great development which has taken place in the fish trade, in this and other ports in the Bristol Channel, during the last two or three years, and which is likely to increase a great deal in the future. Many steam trawlers are now at work, and to enable them to bring their catches to port and send them to market, enormous quantities of ice are required. Besides this demand for ice there is the usual hotel, restaurant, and private consumption. Hitherto all the ice obtainable here has been imported, and stored till required, but as it can be manufactured from pure water for much less than it costs to import, and is also of a superior quality as regards hardness, purity, and clearness, a company has been formed which is about to erect machinery capable of making from 5,000 to 6,000 tons per annum. In addition to the manufacture of ice, the company purpose erecting cold storage rooms or freezing chambers, in which fresh meat, fish, game, and poultry may be kept for an indefinite time. These cold rooms will be similar to the freezing rooms or holds on board the steamers which bring frozen meat from the colonies of Australia and New Zealand to this country.

Chilian Borax.—From some analyses made by Señor Emil Eisele, of Valparaiso, and by Mr. J. Clark, of London, of several samples of crude Chilian borax, it would appear that Chili is capable of producing at least as good borax as California, the quality being equal to a good deal of that which comes from Italy. The attempts which are being made to open up a borax industry in Chili would therefore seem likely to prove successful.

Gelatine.—The firm of George Nelson Dale and Co., gelatine manufacturers, of Emscote Mills, Warwick, and 14, Dowgate Hill, London, has been registered as a limited liability company under the style of George Nelson Dale and Co. Limited. There will be no public issue of shares, the whole being taken up by the existing partners. No change will take place in the management of the business.

N-PARNELL PROCESS.—A series of novel the manufacture of soda are about to take ve not already commenced, in this centre of The old Leblanc process has now been d by the ammonia process of Solvay, which e time in active operation at the extensive er, Mond and Co., at Winnington, near e new Parnell-Simpson invention, the sub- eriments, aims at combining the advantages . By using the tank-waste of the Leblanc dual ammonium chloride obtained by the d is decomposed, and the bicarbonate of d by a simple series of reactions. On the drogen, resulting from decomposition of the ide, being driven off it is stored in a gas- d to yield up its sulphur by a new process. much of the already existing plant, erected old works, can still be utilised and adapted rements. From trial experiments made it is reat saving of waste products will be effected, being saved and six hundredweight of sul- or every ton of soda-ash produced.

OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

ket is without fresh feature of prominence. anufacture has not altogether resumed its e of production, there being about 50 or 60 miners still holding out, but supplies of in from the pits of neighbouring companies, listilling and refining go on at a rate which . Only partial success has, as yet, attended put up the price of paraffin scale, but the and naturally fetches bettered prices, being by the scale "corner" now running its nerican market. Indeed, paraffin chemicals ively firm in tone, the only exception being sulphate of ammonia, which retains late akness. Bleach is a trifle better for spot, not so active. Bichromates, at combination , have partly recovered from late feebleness despatches to England and Continent were e satisfactory bulk. Caustic soda is rather vance transactions; other lines practically ices current are:—Soda crystals, 46s. 6d., , £4. 17s. 6d., less 2½ °/₀ Glasgow; borax, £31, and boracic acid, £46, net Glasgow; , 1d., less 10 °/₀ Tyne; caustic soda, white, 72°, £7. 10s., and cream, 60/62°, £6. 5s., erpool; bicarbonate of soda, 5 cwt. casks, casks, £6. 5s., net Tyne; refined alkali, ss 6 °/₀ Tyne; salt-cake, 23s. 6d.; bleaching 5s. to £7. 17s. 6d., less 5 °/₀ Glasgow; otash, 4½d., and of soda, 3½d. (including and 6 °/₀ to Scotch and English buyers trate of soda, 9s.; chlorate of potash, 6d., ate of ammonia, £11. 5s. to £11. 7s. 6d., araffin scale, hard, 2¼d., soft., 1¾d. to 2d.; ⅜d. to 3d.; paraffin spirit, 7d. to 8d.; er, £13. 10s., less 5½ °/₀ Liverpool. Clyde k included 34,080 bags sugar, 8,986 bags 1,305 barrels rosin, and 1,640 tons pyrites.

TAR PRODUCTS MARKET.

main in the same state as indicated in our week ago both 90's and 50/90 were reported s have not increased. Crude naphtha keeps present month's delivery, and carbolic acid is at 4s. per gallon delivered free to London. ains unchanged, and pitch is still almost day's prices may be taken as 2s. 9d. for 1d. for 50/90; creosote, ¾d. to 1d.; grease ; pitch, 11s. 6d. to 12s. 6d.; anthracene, A quality.

THE SULPHATE OF AMMONIA MARKET.

WHETHER there has been an increased demand during the past few days we know not, but it is certain that during this week makers have been able to realise better prices f.o.b. Hull. The Hull values now nearly approach those of London. We have heard of several sales at this port (Hull), the sellers having realised £12 or a fraction less, so that the present value may be taken as £11. 17s. 6d. to £12. London may be regarded at £11. 15s. and higher, and Leith £11. 10s.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

13274. THOMAS DONNITHORNE. For improvements in the treatment of sewage. September 30.

13277. FREDERICK NETTLEFOLD. For the synthetical or artificial production of quinine or body of the chemical composition of quinine. September 30.

13322. ERNEST SOLVAY. For improvements in limekilns. October 1.

13324. JAMES NICHOLAS and H. H. FANSHAWE. For a new and improved method for the recovery of the precious metals and platinum. October 1.

13325. JAMES NICHOLAS and HENRY HORATIO FANSHAWE. For an electro-chemical process for the recovery of the precious metals. October 1.

13336. JAMES EDWARD JOHNSON-JOHNSON. For improvements in the manufacture of acetic acid and in apparatus therefor. October 1.

13366. WILLIAM LLOYD WISE. A communication from The Actien Gesellschaft für Chemische Industrie of Germany. For new process of manufacturing retene from resin oil. October 3.

13467. WILLIAM SMITH. For improvements in the manufacture of cement. October 5.

13483. WILLIAM ELI CARRINGTON and JOHN BROCKLEHURST. For improvements in or applicable to kilns for calcining limestone, iron ore, and for other analogous purposes. October 5.

COMPLETE SPECIFICATIONS ACCEPTED.

13007. JOHN COPE BUTTERFIELD and HUGH HERBERT MASON. For improvements in the treatment of sewage and the recovery of valuable products therefrom. October 12, 1886.

15175. JOHN CLAYTON MEWBURN. A communication from Louis Teilliard, of France. For improvements in and apparatus for the manufacture of ozone, and its application to the purification or treatment of alcoholic liquids, and other similar purposes. November 22, 1886.

15391. SOPHIA HILL CROLL. For improvements in the distillation of ammoniacal and other liquors, the concentration of liquids and salts in solutions, and in the means or apparatus employed therein. November 25, 1886.

15896. WILLIAM PHILLIPS THOMPSON. A communication from Salom Bensaude, of France. For the manufacture of alcohol from manioc, or improvements relating thereto. December 4, 1886.

15946. JOHN CLARK. For improvements in the process of obtaining alloys of aluminium with certain other metals. December 6, 1886.

2831. JOHN HARREY HARFORD and WILLIAM W. REEVES. For an improved disinfecting and curative device and composition or powder to be used therewith. February 23, 1887.

12031. HERBERT JOHN ALLISON. A communication from George Washington Banker, of United States. For improvements in paints and paint compounds. September 6, 1887.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in localities may vary.*

		£	s.	d.
ACIDS:—				
,, Acetic, 25 °/₀	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6⅞
,, Arsenic	per cwt.	0	12	9
,, Chromic 70 °/₀	per lb.	0	0	4¼
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.	per bottle	0	0	6
,, ,, (cylinder) 30° Tw.	,,	0	2	9
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4⅛
,, Sulphuric (fuming 40 °/₀)	per ton	12	0	0
,, ,, (Brimstone 168°)	,,	4	5	0
,, ,, (Pyrites 168°)	,,	3	7	6
,, ,, (spent oxide 168°)	,,	3	17	6
,, ,, (,, 150°)	,,	2	5	0
,, ,, (Pyrites 150°)	,,	1	17	6
,, Tartaric	per lb.	0	1	7
Arsenic, white powdered	per ton	10	12	6
Alum	,,	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3½
,, = 24°	,,	0	0	1¾
,, Carbonate	,,	0	0	3½
,, Muriate	per ton	22	0	0
,, ,, (sal-ammoniac)	per cwt.	34/- & 32/-		
,, Sulphate (grey), London	per ton	11	15	0
,, ,, (grey), Hull	,,	11	17	6
Aniline Oil	per lb.	0	0	9¾
,, Salt	,,	0	0	8¼
Antimony	per ton	35	0	0
,, (tartar emetic)	per lb.	0	1	0
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	4	0	0
,, Sulphate (native levigated)	,,	3	5	0
Bleaching Powder, 35 °/₀	,,	7	15	0
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	12	5	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 °/₀ f.o.b. London,	per unit per cwt	0	1	3
Benzol, 90 °/₀ ,,	per gallon	0	2	9
,, 50 °/₀ ,,	,,	0	2	1
Carbolic Acid (crystallised 35°)	per lb.	0	1	2
,, (crude 60°)	per gallon	0	3	9
Creosote (ordinary)	,,	0	0	1½
,, (filtered for Lucigen light)	,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	1	1
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston	,,	0	11	6
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	39	15	0
,, Sulphate	,,	13	10	0
,, Oxide (copper scales)	,,	36	15	0
Glue	per cwt.	1	17	6
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	53	0	0
Iron (turnings)	,,	1	13	0
,, Peroxide (blue h	,,	0	7	0
,, ,, (bog o	,,	1	13	0
,, ,, (preci	,,	3	0	0
,, Sulphate (copp	,,	1	2	6
Sulphide (antim	,,	1	0	0
heet) for ca		13	7	6
ate (whi		27	5	0
(brow		19	0	0
...		22	10	0

Lime, Acetate (brown)	per ton			
,, ,, (grey)	,,			
Magnesium (ribbon and wire)	per oz.			
,, Chloride	per ton			
,, Carbonate	per cwt.			
,, Hydrate	,,			
,, Sulphate (Epsom Salts)	per ton			
Manganese Sulphate	,,			
,, Borate	per cwt.			
,, Ore, 70 °/₀	per ton			
Methylated Spirit, 60° O.P.	per gallon			
Naphtha (Wood), Solvent	,,			
,, ,, Miscible, 60° O.P.	,,			
OILS:—Castor	per cwt.			
Cotton-seed	per ton			
Linseed	,,			
Lubricating, Scotch, 885°—890°	,,			
Petroleum, Russian	per gallon			
,, American	,,			
Silver (metal)	per oz.			
,, Nitrate	,,			
STARCHES:—				
Sago	per cwt.			
Potato (farina)	,,			
Sodium (metal)	per lb.			
,, Carb. (refined Soda-ash) 48 °/₀	per ton			
,, ,, (Caustic Soda-ash) 48 °/₀	,,			
,, ,, (Carb. Soda-ash) 48 °/₀	,,			
,, ,, (Soda Crystals)	,,			
,, ,, (Crystal Carbonate)	,,			
,, Chlorate	per lb.			
,, Borate (Borax)	per cwt.			
,, Bichromate	per lb.			
,, Hydrate (74 °/₀ Caustic Soda)	per ton			
,, ,, (70 °/₀ Caustic Soda)	,,			
,, ,, (60 °/₀ Caustic Soda, white)	,,			
,, ,, (60 °/₀ Caustic Soda, cream)	,,			
,, Bicarbonate	,,			
,, Hyposulphite	,,			
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.			
,, Silicate (glass)	per ton			
,, ,, (liquid, 100° Tw.)	,,			
,, Sulphate (Salt-cake)	,,			
,, ,, (Glauber's Salts)	,,			
,, Sulphite	,,			
Potassium (metal)	per oz.			
,, Bichromate	per lb.			
,, Carbonate, 90%	per cwt.			
,, Chlorate	per lb.			
,, Hydrate (Caustic Potash)	per ton			
,, Nitrate (refined)	per cwt.			
,, Prussiate Yellow	per lb.			
,, Sulphate, 90 °/₀	per ton			
,, Muriate, 80 °/₀	,,			
Strontium Hydrate, 98 °/₀	,,			
Sugar, Beet	per cwt.			
,, Cane	,,			
Sulphocyanide of Barium	per lb.			
,, Ammonium	,,			
Sulphur (Flowers)	per ton			
,, (Roll Brimstone)	,,			
Superphosphate of Lime (28 °/₀)	,,			
Tallow	,,			
Tin (metal)	,,			
,, Crystals	per lb.			
Zinc (Spelter)	per ton			
,, Chloride (solution 96° Tw.)	,,			

The Chemical Trade Journal,

SATURDAY, OCTOBER 22, 1887.

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TO ADVERTISERS.

SPECIAL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

In the first week of the approaching New Year we shall issue a **SPECIAL NUMBER** of the **Journal.** We propose to bring our first volume to a close with the last Saturday in December, 1887. The issue of January 6th, 1888 (No. 33), will commence Volume II. It will be an enlarged special number of very general interest. We shall issue along with it a **Title-page** and **Index** for the first volume, together with a neat and useful **Office Almanac,** suitable for our subscribers, which is now in course of preparation.

Including our regular subscribers, our New Year's Number will be issued to **NOT LESS THAN 10,000 FIRMS AND INDIVIDUALS,** so that intending advertisers will see at once, that this issue is worthy of their special attention.

We may explain that in our Publishing Department, we possess very carefully compiled lists—in most cases the result of special knowledge and information at our command—of every firm of repute, both at home and in the main trading centres abroad, connected with the various industries whose interests it is our province to serve. We utilise these lists week by week, by selecting a number of them in turn, and sending out free copies of the Journal *to those firms who have not yet become annual subscribers. The result is* that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of the New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO,** numbering altogether, as we have stated, not less than **10,000** names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

RIVER POLLUTION.

In several papers read before the members of the Sanitary Congress at Bolton in September last, very various and conflicting views were uttered by the principal speakers upon the subject of water analysis and river pollution; but the one we feel most of all bound to criticise is that read by Mr. John Collins, as he wished his hearers to infer that little or no damage was done by bleachers in turning into the stream their waste liquors which have been used in the ordinary course of bleaching. In fact, Mr. Collins' paper on the sewage question and river pollution contains the following statement, which we feel bound to deny the accuracy of. He says, "the bleacher contributes nothing which may be properly considered a very serious pollutant." Now we urge that this statement has certainly not been proved, and that on the other hand we hope to show that not only does the bleacher contribute something which *is* a "serious pollutant," but also that the polluting agent is the main cause of the serious state of many of our rivers in some of our manufacturing centres.

During the past hot and dry summer the small amount of rainfall has kept the water in the Irwell and its tributaries in a very low state, and the solid matter and also that in solution being more concentrated than usual, has caused the most noisome smells in the vicinity of the banks. From Higher Broughton right down through Salford the effluvium has been strongly discernible even in the public streets, and in several instances families have left their residences for more healthy districts until the river bed should have been scoured again by the autumnal rains. By many people this state of things is wholly ascribed to sewage, and to some extent no doubt this is so, but had the bed of the stream been in its normal state, the amount of purification effected would have been much greater than is going on to-day.

The fact is that Manchester is the great manufacturing centre of the United Kingdom. One can scarcely walk three miles away without coming to another of those vast hives of industry with which this part of Lancashire is studded. Bleachers', dyers', calico-printers', and paper-makers' factories exist all round; they use large quantities of water for the ordinary purposes of their business, together with large quantities of various chemical agents, vitriol, spirits of salts, soda-ash, caustic soda, bleaching powder, etc., most of which, after they have done their work, are run off into the nearest water-course. It has been assigned as a reason why these works are in almost all cases planted on the banks of a stream, that it is in order to secure a good supply of clean water, and no doubt this is one reason; but one equally as weighty is the facility there is of getting rid of the vast quantity of dirty water and waste substances emanating from works of this kind.

Let us examine a stream in an agricultural district, winding its way through arable or pasture land, but with no manufactories whatsoever upon its banks. We shall find flowing down its bed water of the clearest colour imaginable; as the bottom of the stream is a thin layer of black mud, in which many water weeds may be found growing. In many coun

streams the weeds accumulate to such an extent as to render them almost impassable. Dotted about on the streams and watercourses are houses and hamlets, the sewage from which often runs direct into them, and there is no doubt but that up to a certain point a stream of flowing water does purify itself if nature's conditions are duly observed. What are nature's conditions? Simply this: aquatic vegetation must be present. Lovers of boating on the Thames, especially on the upper reaches, will not require to be told of the immense beds of weeds, chiefly the *Anacharis alsinastrum*, which grow in the waters there, they have unfortunately too often proved a death-trap to bathers for their existence to remain unrecognised. These weeds are in most cases fixed in the layer of mud in the river bed upon which they partly feed. The leaves also absorb carbonic acid from the water, and under the influence of sunshine give out oxygen, and in this condition the oxygen is very active. Aquatic vegetation takes up the nitrogenous and other matter from the water, feeding upon it and the evolved oxygen is the one great aid in oxidising the polluting matter which if left to enter the putrefactive fermentation becomes a nuisance and a danger. We have already stated that up to a certain point a stream will purify itself from imported pollutants, and we believe that as the subject becomes more studied from a rational standpoint the limit will be defined much more closely than it can be to-day. We can no more continue to pour sewage or any other polluting matter *ad infinitum* into a stream and expect it to purify itself, than to expect a few million gallons of water to flow through a half-inch pipe, of a length, and in a time quite unsuitable for it.

What we wish to point out in this article is the necessity of allowing weeds to grow in our streams and watercourses so as to act as furnishers of oxygen, and in order that this may be accomplished, steps must be taken to prevent the introduction of all those chemical substances which are destructive to aquatic vegetation. In the series of articles which follow, we shall endeavour to point out those substances noxious to aquatic weeds, commencing with those substances emanating from manufactories and mills in which the operations of bleaching are carried on.

(To be continued.)

THE ANALYSIS OF TRADE PRODUCTS.

I. INTRODUCTORY.

It has been suggested to us that we might be useful to many of our subscribers by publishing a series of articles upon the above subject, and seeing that so many of our subscribers are users of chemical products, such as dyers, bleachers, calico printers, etc., we feel that a description of the methods usually employed to determine the actual values of the articles they use would be valuable in many instances. Moreover, there are many methods of analysis frequently used in works not to be found in ordinary text books; they may not be of the highest degree of accuracy, but they are rapid, and quite exact enough for the rough examination of articles in course of manufacture. Again, we have been used to methods of analysis specially formulated for certain objects, and as these have never been published they may be reasonably included in such a series of articles template issuing now. Of course we do not wish e the services of the professional chemist; he may referee in all cases of dispute; but we see no the ordinary testing of chemicals such as soda- g powder, and such like materials should not be purchaser's works. Many indeed do now test ials the- ase immediately on their arrival, has' d there is no reason why this At all works there is sure willing to learn and to make ld execute with sufficient ch it is certainly neither ned chemist's attention all in a works, his than in performing a series of routine tests which an intelligent lad, hours training, could do quite as well.

We hope these few remarks will be taken to hea manufacturers who have the words on their lips: must have a chemist," and relegate him, when ol some dark lumber-room, and occupy his whol turning out analyses (tests rather) of the drugs the effectually prevent his being of any real help to th other department of their business. Thank goodn future prosperity of British trade, there are not ma individuals in existence; but there are some, an our remarks are addressed.

Our remarks in this our first chapter must o sidered as introductory; it is impossible to sail into the direct analysis of trade products; standar will be needed, apparatus will require purchasing but not least, a room will have to be set apart f poses of a laboratory.

The Laboratory.—We say, once for all, d any room simply because it happens to be vaca select a room over steam boilers, as was once th works in Runcorn. Should a boiler explosion oc dreadful fate would await the apparatus. Neit the laboratory be placed over a stove for drying nozzles, as was the case at a steel works in Sh years ago, unless indeed it is intended that the che be enabled to fry his soles upon the heated floor.

The laboratory should be upon the ground lighted by windows fore and aft, and be well su gas and water; it should be in an easily accessib as regards the work to be superintended, and b dust and corrosive vapours. As to the internal fit laboratory—sinks, benches, gas supply, water su etc.—no rule can be laid down; it is good to b vided, so that the various apparatus can remain immediate use and so time be saved. According t to be performed, so will the fittings of the laborat be varied, and much expense may often be saved the advice of those used to such matters.

Apparatus.—A good balance is above all thin necessary, and a good set of weights extending fr gramme to 100 grammes for use with it. Balan had varying in price from £4 to £20, but for £1 very servicable instrument may be obtained. may vary between very wide limits, according to of the work required to be done; and, to aid the be pleased to advise any of our readers in m purchase.

The next articles required will be burettes, and may find most of the instruments we shall illustrated in *Griffin's Chemical Handicraft*, pu Messrs. J. J. Griffin and Sons, of 22, Garrick-stre Garden, London, and we shall refer to them by t of the illustration in the 1877 edition. Thre should be provided of the pattern illustrated by fig and one stoppered burette of the pattern 2,690 Lussac burette illustrated by figure 2,740 will als useful.

Several pipettes should be provided, one of centimetres (c.c.) capacity graduated into tenths centimetre. One each of capacities to deliver 25, 50, and 100 c.c. should also be purchased, should be fixed in a stand as shown in fig. 2,775.

A few other pieces of apparatus will be requir mence with, such as:—A 5in. mortar and pest crucible tongs, fig. 122; retort stand, fig. 265; triangles, fig. 306; Bunsen burner, fig. 975; a crucible and lid, holding about 25 c.c. of water; s of beakers, No. 1,465; several funnels, No. 1, 3in., 4in., and 5in., and filter paper to match variety of flasks of various sizes, from 200 c.c. No. 1,401; a few 6in. and 8in. Berlin porcel No. 1,743; a few books of neutral litmus paper, a test mixer, fig. 2,790; and a porcelain testin 2,815. These may be termed the general labora necessary for almost every kind of work, and will

all cases. Besides the foregoing, there will be rom time to time other pieces of apparatus; but we cribe these in the articles in which they are men-

y now proceed to the preparation of a few standard

(To be continued.)

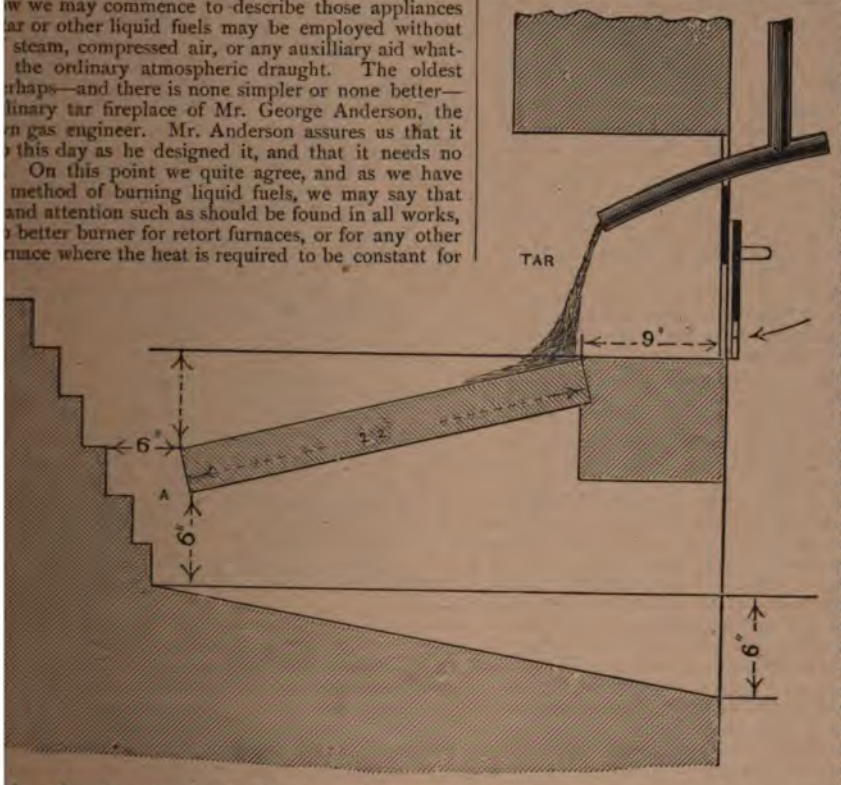
GAS-TAR AND ITS USES.

IV.

well screened and well filtered tar, as free as possi- gas liquor, it now remains only to treat of the actual n; but this must on no account be attempted before tor has succeeded in getting an even flowing stream e of about three gallons per hour. Such experi- these are better carried on in a warm situation, f the retort-house, so as not to interfere with the rein, as it will be found somewhat tedious at the quiring much attention to details. Once the task of an even flow of tar has been accomplished the of the work is comparatively easy.

w we may commence to describe those appliances ar or other liquid fuels may be employed without steam, compressed air, or any auxilliary aid what- the ordinary atmospheric draught. The oldest rhaps—and there is none simpler or none better— linary tar fireplace of Mr. George Anderson, the n gas engineer. Mr. Anderson assures us that it this day as he designed it, and that it needs no

On this point we quite agree, and as we have method of burning liquid fuels, we may say that and attention such as should be found in all works, better burner for retort furnaces, or for any other nace where the heat is required to be constant for



ds. On the other hand, this burner is not well steam boilers, especially of the tubular or double- as the burning vapours become too readily cooled with the iron of the boiler, which is at a compara- temperature. Neither will it do at all for such s heating tar stills on account of the intermittent of the work; tar burning with a natural draught that the furnace should be tolerably hot before the ned in, and this would scarcely be the case with ar stills. The reason that Mr. George Anderson's has been so successful for tar-firing, arises from the he mixed vapours of the tar products and air are travel a long way through intensely heated flues, the air supply is properly managed complete com- hould be attained without *the employment* of a ss of air.

A section through Mr. George Anderson's tar fireplace may be seen in the accompanying illustration, which is taken from a description supplied to the committee of the Tar Producers' Association by Mr. Frank Livesey, and published with their sanction. The woodcut shows a tar furnace arranged for a stage retort house, and it can be applied to a setting of seven retorts, provided that the tar is allowed to flow into the furnace not less than 18 inches below the centre retort. The tar-coke formed by the partial combustion of the tar collects, and is pushed down to the bottom of the incline, so that the air coming up under the tile hearth at A must pass through the mass of red-hot tar-coke. Any clinker or dust that collects at the lower end of the tile hearth must be cleared out every now and again from below, but the opening A must never be allowed to be free from red-hot fuel or the quantity of cold air entering there will soon bring down the heat. In operation, as the tar drops from the end of the pipe, the greater part is caught by the inrush of air, shown by the arrow, and fired by the heat of the furnace. There is no patent connected with this plan of burning tar, and Mr. Livesey has intimated that it may be seen at work at the Old Kent Road Gasworks in London, or at Rotherhithe.

The above plan has been tried by several gas engineers of repute, and some of them say that they have not been fortunate with it. Mr. Bower, of West Hartlepool says:—"I next turned my attention to the use of tar without steam; but regret to say that with this method I have not been at all fortunate. The tar in this case ran, as before, from a tank on the top of the bench through a ½-in. pipe, terminating with a cap, in which was drilled a hole one-sixteenth of an inch diameter. Through this aperture the tar passed, dropping on to an inclined plane formed of a fireclay tile the width of the furnace, and built in with brickwork. A groove 2 in. by 1½ in. was cut in this tile, in which the tar ran until it came in contact with the flame inside the furnace. Openings for the admission of air were left in the brickwork somewhat similar to those described in the last case. The quantity of tar consumed per ton of coal carbonised with this arrangement was 25 gallons. The heat in the beds, however, was not at all satisfactory; and the retorts gradually went back until we were not able to burn off more than 60 per cent. of their ordinary charges. I made several trials with this method; first using a larger quantity of tar, and admitting more air, then less, as I thought was required. All, however, ended in similarly unsatisfactory results; till ultimately I abandoned the system altogether." At Rotherhithe they have been very successful in the use of tar as fuel; but at this station the retorts are in settings of ten, and there is no retort immediately over the furnace, and therefore ample space is afforded for the complete combustion of the tar. The following remarks have been supplied from the Rotherhithe

works:—"With sufficient care and attention these can be well maintained, and the tar may be burned without smoke."

Wear and Tear of Furnaces.—There is less clinkering, and the life of the furnace chiefly depends upon the intelligent control of the dampers. Too strong a draught, with a free supply of tar will melt a furnace down in a few hours, but with care the tear and wear is not excessive.

Necessary Precautions.—Tar fires must be kept well broken up, both the coke and the carbon formed by the semi-combustion of the tar. If this be not done smoke will be produced, the fire will be done, and tar will run to waste, while the retorts will not be hot. A good bottom draught through the solid fuel A is a first essential. The secondary supply of air above the fuel must be ample, and very great care must be taken to adjust the dampers to secure complete combustion without doing damage to the furnace.

Alterations to Furnaces.—These need be only trifling, and consist in making a hole of about six square inches in area on each side of the door frame, just above the level of the solid fuel, and the length of the ordinary coke furnace has been reduced about 30 per cent.

Comparative cost of Tar and Coke against Coke alone.—The figures given in Mr. F. Livesey's letter to *The Journal of Gas Lighting* of March 23rd, 1886, can be maintained, viz, tar and coke, 5s. 2d.; coke alone, 7s. 4d. per furnace per twelve hours in a setting of ten 20ft. through retorts, taking coke at 8d. per cwt. and tar at ¾d. per gallon, a saving of 2/2 per furnace per twelve hours, each furnace consuming 3 cwt. of coke and 47 gallons of tar (about 4 gallons per hour), and at the rate of 17 gallons of tar per ton of coals carbonised.

(To be continued.)

MANSFIELD'S OIL-GAS.

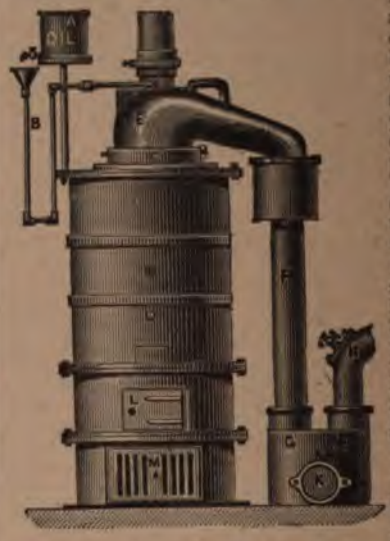
Our readers do not require telling that oil-gas is no new invention. So early as the year 1827 we find on reference to Parliamentary annals evidences of the pre-existence of oil-gas works. During 1827 the Edinburgh Oil-gas Company applied for an Act to enable them to convert their works into a coal-gas works, the oil-gas making having proved so unprofitable. It was stated in evidence that the usual production was about 75 cubic feet of a specific gravity of 908 from a gallon of the oil employed, and that the deposition and leakage was so great that the quantity actually delivered to customers only amounted to 55 cubic feet per gallon. Turning to the monetary side of the question, we find that out of a capital of £80,000 their loss was stated to be nearly £60,000, so that with such experiences as this before them it is not to be wondered at that oil-gas works did not increase. But it must not be forgotten on the other hand that this was not the most flowery time for coal-gas companies; so late as 1833 only about half a dozen paid a dividend of 10 per cent.; thirty more 5 per cent., while many of the remainder were making a loss.

The oil employed in the early days of oil-gas making was whale-oil, and we learn from an estimate given by Messrs. Taylor and Martineau in 1821 to a gentleman at Ipswich, that the oil cost at that time £20 per ton, and the consumption of oil-gas per burner averaged 1⅛ to 1¼ cubic feet per hour.

Mr. Adam Anderson, of Perth, about the year 1822, considered that with whale-oil at £30 per ton the cost of 1,000 cubic feet of oil-gas would be 33s. 11d., and he also expressed himself very freely with re[illegible] to the illuminating power of oil-gas. Dr. John Da[illegible] of Manchester, superintended several experiments at [illegible] Lane Gasworks in London, and he found the yield [illegible] gallon of whale-oil to be about 95 cubic feet of a spe[illegible] of 675, or 67 cubic feet of a gravity of 930. [illegible] the illuminating power of oil-gas to coal-gas as [illegible] volume.

A production of 80 [illegible] from a gallon of whale-oil means 20,000 cubic [illegible] that with such a large yield (double that prod[illegible]ion of coal) some of our readers will no [illegible] by the process did not formerly pay its way. The answer is very easy to [illegible] the first place, the apparatus formerly employed w[illegible] crudest description; secondly, no one could expect [illegible] gas profitably from a raw material costing £30 per t[illegible] coal did not cost as many shillings; and, thirdly, t[illegible] of gas by meter was not universal in the early day[illegible] lighting.

Circumstances are, however, now so altered tha[illegible] two objections no longer hold good. There ar[illegible] different forms of apparatus in existence for the p[illegible] of oil-gas of high illuminating power, while the cru[illegible] gas-making purposes may be had for twopence per [illegible] about 40s. per ton, so that with these perfected [illegible] oil-gas making is not only simplified, but made a co[illegible] success. Amongst the various apparatus consti[illegible] make illuminating gas from oil, we wish to des[illegible] form which seems to us so simple as to meet with [illegible] attention wherever a large amount of lighting requ[illegible] done. In the case of cotton mills, dyeworks, bles[illegible] paper mills, chemical works, and such other facto[illegible] apparatus seems to recommend itself wherever c[illegible] seventeen candles illuminating power costs more [illegible] shillings and sixpence per 1,000 cubic feet. We [illegible] the apparatus of Messrs. Edwin Mansfield and [illegible] Barton Arcade, Manchester, shown in the acco[illegible] illustratio[illegible] apparatu[illegible] compact, [illegible] be used [illegible] variety o[illegible] fats wit[illegible] pairing [illegible] ciency o[illegible] producin[illegible] The gas [illegible] duced b[illegible] the cold [illegible] the res[illegible] throu[illegible] syphon [illegible] into the [illegible] cast-iron [illegible] The g[illegible] leaving [illegible] passes th[illegible] pipes E [illegible] a small [illegible] denser G [illegible] thence [illegible] gasholde[illegible] the pipe [illegible] purifier,



or scrubber is employed, as the gas, even im[illegible] after its generation, is much purer than coal [illegible] purification. All schemes for the manufactur[illegible] gas have had to bear with much opposition from th[illegible] companies, and we may not wonder at this, for [illegible] one penny per gallon the new gas may become a ve[illegible] rival in many districts where gas is selling at a hi[illegible] The thorough practicability of the Mansfield oil-gas [illegible] has this year been demonstrated at Stand 671 in [illegible] Jubilee Exhibition, Manchester, where it may be s[illegible] ing almost daily, and we may say that from our own [illegible] knowledge it has attracted much attention.

Messrs. Mansfield and Sons have been connecte[illegible] gas making for the past fifteen years, but last year [illegible] out a new patent for the present apparatus, which [illegible] all the improvements suggested by their long e[illegible] The apparatus is strongly made, and can scarcely [illegible] or put out of order by unskilled men; the outer c[illegible] strong cast-iron, fire-clay blocks moulded to the [illegible] and shape are fitted inside this casing, the re[illegible] requiring repair or renewal, and this is effected [illegible] simple and ingenious means. The connecting joint [illegible] the retort head and hydraulic are melted lead, at t[illegible] the retort and water at the cup of the hydraulic pi[illegible]

the advantage of instantaneous disconnection or connection by merely lifting or lowering the connecting elbow. The process of gas-making is automatic, with the exception of putting a little coal on every half hour, a service which can be easily rendered by a gardener, a railway porter, or labourer without interfering with his regular duties. One advantage possessed by this apparatus is that any kind of oil or grease may be used with it, and this is certainly a very strong recommendation to those who are about erecting apparatus in foreign countries. In Africa, for instance, it is at work producing oil-gas from cocoa-nut oil, which is cheap and plentiful there. At Samarang, Cheribon, and Sourabaya the system is in operation working with native oils.

At home this gas is largely employed for lighting country houses, and all who have used it testify to its excellence as an illuminating agent. It is very well known that in lighting with coal-gas, especially the gas of our northern cities, that the decorations of rooms are quickly tarnished, that picture and window-blind cords are rapidly destroyed, and that curtains are rendered rotten in an inconceivable short space of time, by reason of the sulphuric acid emanating from the products of combustion. With oil-gas, every one who has used it certify that it has no smell while burning, that it does not injure household decorations, neither has it any effect on flowers growing in a room, which certainly cannot be said of ordinary coal-gas.

Some years ago we made an examination of an oil-gas process—certainly not so simple as that of Messrs. Mansfield and Sons—and we came to the conclusion that gas of fifty candles illuminating cost nine shillings per 1,000 cubic feet, but as it was only burned at the rate of 1¼ cubic feet per hour against 4 feet of ordinary coal-gas, we see no reason to doubt the statement made by a correspondent of the *Field* newspaper, that in comparison with coal-gas, Mansfield's oil-gas costs two shillings and sixpence per 1,000 cubic feet.

About a fortnight ago some very interesting experiments were made with this apparatus at the Manchester Exhibition with waste animal oil sent from the Holt Town works of the Manchester Corporation. Mr. C. Kilpatrick watched the process, and was pleased to see a beautiful white gas, much superior to coal-gas, made rapidly from the waste oil at the rate of 95 cubic feet per gallon. With this gas from the waste oil four stands at the Exhibition were lighted up and an "Otto" gas engine driven all one day and evening.

It will be seen that this gas is quite different to that produced by saturating air or other gases with vapours of hydrocarbons, and the small amount of attention the apparatus requires, renders it specially suitable for railway stations, churches, and isolated situations to which gas companies have not extended their mains.

CHEMICAL EXHIBITS AT THE MANCHESTER EXHIBITION.

XVI. ALKALIS, ACIDS, AND SALTS.

When we face Stand No. 823, containing the exhibits of Messrs. J. M. Collett and Co., of High Orchard, Gloucester, we are tempted to inquire whether isinglass, which forms the principal portion of this exhibit, is an alkali, an acid, or a salt? However, it has been placed by the committee in this group, so of course we must consider it as one of these.

Isinglass, as is well known, is the dried swimming or air-bladder of various fishes. The bladders differ greatly in form and structure throughout the class of fishes. In its simplest form it appears as a closed sac or bag, in others there are two or three divisions. Whatever form it assumes, the air-bladder has but one function, namely, that of enabling the fish to alter its position at will, and to rise or sink in the water. Its use is that of a hydrostatic apparatus. By compressing the gas it contains, the body of the fish is rendered specifically heavier as compared with the surrounding water, and is thus enabled to sink therein, and the contrary effect is produced when the muscular power is released. In preparing the bladders for market, some are simply placed on the sand of the shore, others are *hung up to dry*, while slightly distended, forming the pipe isinglass, and others are cut open, cleansed, and laid on matting to dry; this constitutes leaf isinglass, which is much preferred. Russian isinglass is most esteemed, and the finest is obtained from a species of sturgeon, great care being taken in cleansing and drying, and it fetches the highest price of any. Isinglass is used by brewers and wine merchants to clarify their goods. It is partially dissolved in a weak acid solution, and when a small quantity is added to wine or beer it becomes totally insoluble, and either rises to the top, or sinks to the bottom carrying all the suspended particles with it, rendering the beverage clear and brilliant.

Messrs. Collett and Co. exhibit specimens of isinglass from all the markets of the world, all of which are remarkable for their purity of colour. They are shown in their natural state, cut in strips, and dissolved as finings for various beverages, notably beer, wine, and cider, the one-thousanth part being in most cases sufficient to render the beverage brilliant. The same case also contains specimens of bisulphites, of which the exhibitors are large makers—perhaps the largest in the United Kingdom—bisulphite of lime, bisulphite of soda, the bisulphites of magnesia and potash, which are all worthy of attention by those of our numerous readers who are interested in the brewing industry.

Messrs. C. B. Cullerne and Co., of Liverpool, have a very similar exhibit to the foregoing at Stand 824, where may be seen specimens of isinglass, finings, bisulphite of lime, sulphurous acid, etc.

Turning now to the manufacturers of alkalis, acids, and salts proper, we find at Stand 814 a very good collection of chemicals used by bleachers, finishers, dyers, and calico printers, exhibited by Messrs. Riley and Sons, of Hapton. Almost every requisite used in these industries of a chemical nature is manufactured by them. Of oil of vitriol they are large makers, and not only do they produce ordinary pyrites vitriol which is largely used for common purposes, but very large quantities of acid made from brimstone. At this works the rectification or concentration of the acid is not done in the old-fashioned way, in glasses which are so liable to break and cause a nuisance, but in platinum stills, which cost nearly £3,000 apiece, and may be seen at Stand 802 in the Exhibition. Messrs. Riley's acid, even the brown or common quality, is of a very good description, and they send it to long distances away from the works. The alkali products of this firm will not be mentioned here, as the soda manufacture will be treated of in a separate article, but we may state that Messrs. John Riley and Sons were one of the first manufacturers to employ mechanical furnaces in the calcination of soda-ash, and to employ producer-gas for that purpose.

Amongst the salts shown by this firm we notice a very good specimen of their stannate of soda, made, we presume, by the process patented by Messrs. Riley a few years ago; it is largely used by dyers and calico printers. This firm are also makers of a good quality of copperas or protosulphate of iron, which is largely used in dyeing black goods, and also for reducing indigo; and amongst other iron salts we find nitrate and perchloride of iron. There is to be found in this case a crown of crystallised copperas, another of borax, and another of sulphate of copper, which add greatly to the effect of the exhibit, showing at the same time some of the articles sold by the firm. Some of the compounds of tin are also specialities with the Messrs Riley, and they show specimens of tin crystals, tin spirit, and other salts largely used by dyers and calico printers, by whom their brand is well known.

Zinc salts form also a portion of their trade, and their chloride of zinc is an antiseptic much used by warp-sizers as a preventative of mildew. If sufficient chloride of zinc be employed in any sizing mixture it will effectually prevent any growth of mildew, and its use does not bring with it any inconvenience so long as the salt is pure and free from iron.

We happen to be well acquainted with the chemical works of Messrs. John Riley and Sons, and the district surrounding their works, and we are pleased to add that they stand a testimony to the fact that a chemical works can be carried on without devastating the country round about, and we have come to the conclusion that the only way to prevent damage to

vegetation is to isolate the works from each other, so that when any damage is done there are no neighbours near to cast the blame upon. Mr. John Riley, sen., is one of those few manufacturers who live actually upon the works, and his vineries and orchid houses, within fifty yards of his vitriol chambers and muriatic acid towers, testify to the care with which all his chemical operations are conducted. The works were commenced in the year 1844, so that it is something to say, that there has been no damage to the surrounding country after a period of forty-four years of continuous working.

(To be continued.)

THE DANGERS OF CARBONIC ACID.

On Sunday morning, the 16th inst., an occurrence, which caused considerable alarm, excitement, and inconvenience, took place in Oldbury parish church. During the service an unpleasant smell of sulphur was observed, and soon after eleven o'clock a large number of children who were in the gallery fainted. Some of them fell from their seats, causing considerable confusion amongst the congregation. Several choir boys in the chancel were similarly affected. The teachers were, as may be imagined, greatly alarmed, and their terror was increased by the helpless condition in which some of the children lay. It became at once apparent that the children were overpowered by noxious gases. The ventilators and windows were thrown open, the children who had fainted were promptly carried into the open air, and all the school children were quickly got out of the gallery. Many of them, however, fell to the ground as they were walking to the doors. There were not many adults in the gallery, but some of the teachers felt the ill effects of the deadly gases so severely that when they reached the door some of them fell, and had to be walked about for a time before they fully recovered. It is stated that at least twenty persons lost consciousness, and a much larger number were less seriously affected. As may be imagined, the scene outside the church was of a painful and distressing character. Fortunately, however, four medical men — Drs. Lyddon, Lester, Cunningham, and Torbitt—reside in the Church Square, or in close proximity to it, and these were all promptly upon the spot, rendering all the assistance in their power to the sufferers. Two of the victims—Misses Harper and Carter—were conveyed to the house of Dr. Torbitt, where they remained for some time. Others were carried into houses close by, and were attended by Drs. Lyddon, Cunningham, and Lester. The service was brought to an abrupt conclusion. The sufferers, it is said, appeared as though they suffered from the effects of after-damp in coal mines, and a cat that happened to be in the church was suffocated and brought out dead. It is therefore evident that if prompt measures had not been taken the affair would have been attended with much more serious consequences. Various theories are put forward as to the cause of the occurrence. Some affirm that it was foul air forced out of the flues of the heating apparatus, which was being used for the first time this season.

Destruction of a Scotch Distillery by Fire: Damages £20,000.—Fettercairn Distillery, Kincardineshire, one of the oldest distilleries in Scotland, was late on Saturday night, the 15th inst., almost totally consumed. Owing to the inadequate supply of water and the inflammable nature of the material, the flames spread with startling rapidity, and in two or three hours about a thousand quarters of barley and 300 to 400 casks of whisky were destroyed. The damage, about £20,000, is covered by insurance. The distillery belongs to Sir Thomas Gladstone, Fasque, and has been leased for many years by Mr. David Durie. The fire is supposed to have been caused by the overheating of the kiln.

Price's Patent Candle Company (Limited) report a profit on the last half-year's working of £22,000. A *dividend of 8s. per share has been declared.*

Correspondence.

BRIN'S OXYGEN GAS.

To the Editor of the Chemical Trade Journal.

Sir,—Your article in *The Chemical Trade Jour* "The Economical Production of Oxygen" by the pr M.M. Brin Frères is somewhat puzzling.

You say that Messrs. Brin can produce oxygen at 1,000 cubic feet, and that they command the trade by it at 2d. per cubic foot, or £8. 6s. 8d. per 1,000 margin is certainly a wide one, so wide in fact that th soon have competitors.

I see nothing different in their process, except regard to details, from what has been known for very years, viz., the power of baryta to take up atmo oxygen at a low temperature and to give it off agai higher one.

You say that the operation of taking up and giving oxygen occupies two hours, but practically you thin eight operations could be performed in the twenty-four and as each lb. produces about a cubic foot per opera follows that the 62 retorts, operating on three tons, produce something like 50,000 cubic feet per day of t four hours. If this can be produced at 3s. per 1,0 sold at £8. 6s. 8d. it is not a bad business!

Are you not wrong in saying that the gas is compre 120 atmospheres—1,800 lb. per square inch? With to the application of pure oxygen for the revivication o of iron *in situ* for the purification of coal-gas, I have shown in the *Gas World* that this was patented by I about a quarter of a century ago. It was stated in tha some time since that the Messrs. Brin were ready to oxygen compressed in cylinders at 3s. 9d. per 1,000 gas companies will no doubt be ready to take advan it—but is it to be 3s. 9d. or £8. 6s. 8d.? If anything above 10s. per 1,000 gas companies will prefer to diluted with nitrogen as it exists in nature, and com for the loss of light by the inevitable nitrogen by spen trifle in cannel to make up for it.

Yours, etc., Geo. B

[We regret that our article should have proved puz the comprehension of even one of our numerous r On reference thereto our statement appears to us cl definite.

Our correspondent finds nothing novel in the except careful regard to details, but surely no one better than he that, in dealing with patents, detail times prove awkward customers to those who seek them the go-bye. We are aware of Laming's old for the purification of coal-gas, which, however, d appear to have been adopted, probably because could produce oxygen cheaply enough; given oxyg application of it is, of course, open to the whole We did not say that Brin's Oxygen Company would oxygen at 3s. per 1,000 feet; we merely expres opinion that it could be *made* at that price, and we have thought our correspondent, not being withou rience in gas making, would have recognised that oxygen at all for gas purification it must be made spot. Our statement that Brin's Oxygen Company oxygen compressed to 120 atmospheres is perfectly We may add that we cannot sympathise with common attempt to pooh-pooh the success of the i who reduces theory to practice, on the ground t theorist has been before him.

Our readers may like to know that the patent in q for the production of oxygen is No. 157 of 1 Ed. *C. T. J.*]

Awards at the Adelaide Exhibition.—I John Brotherton and Co. Limited, Wolverhampto been awarded, at the Adelaide Exhibition, the first pr gold medal for their wrought-iron tubes and fittings.

IAL NOTICE.

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NORTH STAFFORDSHIRE CHINA MANUFACTURERS' ASSOCIATION.

THE inaugural dinner of this newly-formed Association was held at the Town Hall, Longton, on Wednesday, the 12th inst. Mr. E. Asbury presided, and there was a large attendance, including the Mayor of Longton (Mr. J. Aynsley) and ex-Mayor (Mr. H. M. Williamson). A long toast list was gone through, and the general tone of the speeches was of a hopeful character. The Association has been formed with the view of increasing prices and maintaining the china trade in a proper position; and though previous combinations for this purpose have failed, it appeared to be the general opinion that a scheme had now been perfected which would undoubtedly prove of permanent benefit to the trade. There was an unanimous expression of opinion that for some years past prices had been altogether unremunerative, and that, consequently, an Association like this was not only a matter of desire, but of necessity.—Mr. A. E. Wenham (Birmingham), the auditor of the Association, stated from his experience of a similar Association in the southern division of the county, which was constituted on similar lines, he had every confidence in the prosperity of the new North Staffordshire China Manufacturers' Association. He suggested that it would be well for the objects of the Society if they could secure the co-operation of the foreign manufacturers of china. He was led to believe that this could be accomplished from the fact that the other Association to which he had referred had made overtures to the German manufacturers of a similar class of goods, and had succeeded in getting them to amalgamate with the English manufacturers. He had no doubt that if an effort was made by the china manufacturers of North Staffordshire to obtain the co-operation of the German makers they would succeed.

GERMAN CANALS.

THE atmosphere of the commercial world in Germany at the present moment (says *Kuhlow's*) is full of canals and rumours of canals. Not least in importance among these projects is the proposed canal between Leipzig and Wallwitzhafen. The Leipzig wool-combing works have owned since last July four steam barges of a total carrying capacity of 44,000 ctrs., which ply between Hamburg and Wallwitzhafen. These vessels meet consignments of imported wool in Hamburg, and convey them to Wallwitzhafen, whence they are forwarded by rail to Leipzig. The advantages of this river transport are considerable. The freights are much cheaper than on the railway, and it is a misfortune for the Leipzig woolcombing industry that its only serviceable waterway is limited to a short reach of the Elbe. A direct water connection between Leipzig and Wallwitzhafen would be of very great value. But the canal would have to be of such a character that Elbe boats without respect of size could be navigated right up to Leipzig, and not require to change their freights into smaller vessels. A mere connection between the Elbe and the Saale would not attain this end, the natural formation of the latter river being prohibitory. A glance at the present traffic in Wallwitzhafen, which amounts yearly to about 2,400,000 centners of arriving and 750,000 centners of departing goods, shows clearly enough that if such a canal as is proposed were to be opened between the two points in question it could hardly fail of proving a financial success. We trust that those interested in the industry and trade of Leipzig, which have so largely developed within the last few years, will have energy and enterprise sufficient to carry out their project. The necessary pecuniary means they are hardly likely to lack.

FRENCH ASPHALT.—The directors of the Compagnie Generale des Asphaltes de France, notify that they have resolved to pay an interim dividend of 5s. per share to their shareholders on and after the 15th inst.

THE DURATION OF THE NORTHERN COALFIELD.

THE North of England Institute of Mining and Mechanical Engineers held a meeting on Saturday afternoon, the 8th inst., in the Wood Memorial Hall, Newcastle, Mr. T. J. Bewick presiding. Mr. M. Walton Brown, Newcastle, read a paper on "A further attempt for the correlation of the coal seams of the carboniferous formation of the North of England, with some notes upon the probable duration of the coalfield." Mr. Brown gave a synopsis of the probable correlation of the seams of the upper and lower carboniferous measures, comprising the true coal measure and the carboniferous limestone series. He stated that from a full consideration of the relative positions of the coal seams in the true measures, it appeared probable that they should be considered as portions of one and the same seam which was in continuous formation during a long period of time. If this theory were based upon fact, the coal measures must be then considered as one seam of coal, with interpolated bands or beds of sandstone, shale, and other rocks. In regard to the duration, after ample allowances for dykes and other interruptions, it appeared that the available supply was upwards of 7,000 millions of tons from the coal-measures, and upwards of 8,000 millions of tons from the mountain limestone districts. These quantities would supply the present demand of about 36 millions of tons for over 400 years.—Professor Lebour moved a vote of thanks to Mr. Brown, and spoke of the trouble which the preparation of the paper must have involved. Never, he said, had a correlation of this sort been done more carefully, and he thought it would rank, in time, with the two other correlations of Mr. Buddle and Mr. J. B. Simpson. If what Mr. Brown said about the coal seams in the true measures being considered as portions of one and the same seam were true, then it was an absolutely new fact. He had known for some time that Mr. Brown was inclined to think this was likely, and such data as Mr. Brown had had at his disposal seemed to show it was probable as to some of the seams. If it were shown that each seam was connected with those above and below, the fact was a new one, which would throw a great light upon the physical geography of the carboniferous formation.—Mr. J. B. Simpson seconded the vote of thanks, and it was agreed to.—A paper by Mr. John Allan on "The pyrites deposits of the province of Huelva," was read; and a supplementary paper on the same subject was read by Mr. D. Tyzack.—A vote of thanks was passed to these gentlemen, and the meeting concluded.

DESTRUCTION OF UNWHOLESOME FOOD.

THAT the provisions of the Public Health Act are not inoperative in this city is evidenced by the annual report on the seizure and destruction of unwholesome food in the Manchester market. We do not mean that such seizures were unknown before the passing of that law, for the earliest records of the municipal life of Manchester show that our forefathers were neither ignorant nor careless as to the purity of the food supply. When the Court Leet in 1552 appointed "markete lokers for corne," "markete lokers for fysshe and flesshe," and similar officers, it was for the work now so efficiently performed by Mr. John Page, the superintendent of the markets, and his subordinates. The figures as to the amount of unwholesome food brought to the market, or of such of it as was detected during the year ending in August last, reach a heavy total. Of butchers' meat 14,843 lb. was condemned. The game and poultry numbered 3,025, but of this total rabbits alone account for 2,601. Of the fish brought in no fewer than 120,495 were found to be unwholesome. In this large total the highest places are occupied by mackerel (62,966) and herrings (30,306). There were 10,260 ·ishels of shellfish destroyed. Of the crustaceans the bsters numbered 549 and the crabs 3,200—a total of 3,749. ıen there were 2,060 quarts of shrimps that had to be ıdemned. *The vegetable kingdom* provides a much-smaller contingent of unwholesome food. Fruit, includi cherries, pears, and grapes, amounted to 3,106 lb., the head of "miscellaneous" we have 400 dozen c and 815 lb. of German yeast. The statistics we h show an increase of unsound fish, game, shellfish, c and shrimps, but a considerable decrease in the condemned meat. "The very large importations c "meat in good condition from foreign countries hav "edly checked the traffic in diseased meat whic "prevailed." This is important testimony, and hoped that the traffic in diseased butchers' meat w a thing of the past.—*Manchester Guardian.*

[It may be stated that the Manchester Corporati wilfully destroy these substances as some othe porations do, by burying, or by taking them out hoisting them overboard, they first extract the fa work up the residue for manure.—ED. *C. T. J.*]

Notes and Queries.

BLEACHING POWDER *v.* MANGANATE OF S readers will remember that during the early p summer Sir Henry Roscoe who was called in to great spending corporation, the Metropolitan Board recommended the disinfection of the London se bleaching powder before its exit into the river. meeting of the Board on Friday, October 7th, a presented by the Works Committee stating that past summer deodorising experiments had been under the direction of Sir Henry Roscoe. Durin two months chloride of lime was used, and after ganate of soda was substituted. Sir Henry now in the present state of the river deodorisation is u but in view of a possible return of hot weather i *small* order of 500 tons of manganate of soda ordered in at once. As regards the bleaching po the Board has still in stock, as he says it will n next Spring, Sir Henry Roscoe suggests that portion should be returned to the makers at c Committee finds, however, that the unused chlor amounts to 1,091 tons, and that 302 tons have bee by the makers in excess of their contracts, so tha mittee has instructed the officers of the Board to excess quantity to the several makers, and to ob for the remainder which will be left on the Bo We should expect that the makers will not agre the overplus at this distant date, and the 1,091 t worth what it will bring by such a forced sale.

A MAMMOTH SALT COMPANY composed of salt makers of the United States is about to be will be known as The National Salt Union. Th the Union is protection, and an endeavour to kee and to be able to compete with foreign makers. will be composed of 63 companies in all, 11 i 9 in New York, 30 in Michigan, and 13 in Ohio.

SALT-CAKE IN DIFFICULTIES.—On Friday n 14th inst., an enormous stock of salt-cake store wall in the works of Messrs. Kurtz and Co., at exerted such pressure that it caused the wall to salt-cake was precipitated into the street. The blocked for the time. Fortunately the accident few minutes before eleven; had it occurred a later the consequences would probably have bee a great number of people pass that way taking th dinners to the various works.

THE SALE OF FOOD AND DRUGS ACT.—M Fairley, F.R.S.E., in his report on analyses m borough of Leeds during the quarter ending Sept says—"The following samples have been recei 34; skim milk, 2; butter, 2; cider, 1; total sample of milk was of very low quality, but with of genuine milk. The sample of cider was really tured aerated water, but contained nothing u None of the other samples were found to be adul

SUPPLY IN MANUFACTURING TOWNS.—At the y meeting of the St. Helens Water Committee ıg statement was made by the water engineer :— month the total quantity of water delivered was gallons, which had been distributed to an estima- ion of 67,633 persons, being at the rate of 41·33 head, or 24·14, being less than supplied by ainfall for month ending September 30th, 5·36 responding month last year, 3·47 inches.—At water engineer reported :—The total quantity of ed at Stocks Well and Netherley during the four ıg September 28th was 60,220,120 gallons, being of 5·34 on the corresponding period of 1886. The ered was 63,548,772 gallons, an increase of 9·90.

AL EDUCATION.—Sir William Plowden, K.C.S.I., uggested that some scheme should be devised for on and amplification of the present system of lucation in Wolverhampton, and he has offered to towards this object. Sir William has expressed the result of recent inquiries on the continent— periority of their methods of technical education ne of the most powerful factors in forming the mercial position now occupied by foreign manu-

OF SODA.—Messrs. N. M. Rothschild and Sons that they are prepared to receive subscriptions to Government loan of £1,113,781, which is to be the payment of certificates issued by the Peruvian t as purchase money for saltpetre works in the Tarapaca, which have now become the property ernment of Chili. The price of issue is £97 10s. and the bonds are to bear interest at the rate of t. The redemption of the loan will be effected by on of a cumulative sinking fund.

ECTRO-METAL EXTRACTING, REFINING, AND COMPANY (LIMITED) has agreed to sell its works s to a new company to be registered with a capital o in £1 shares, capable of extending the operations as well as by the erection of five other works in nanufacturing centres. The shareholders of the pany have all agreed to accept fully-paid shares in ded Electro-Metal Extracting, Refining, and mpany (Limited), and in many cases, to largely ir holding. The old company will be liquidated.

BY AN ELECTRIC SHOCK.—Frederick Nelson, y-one years, a lineman employed by the Brush ght Company, was instantly killed on Saturday the 8th inst., whilst connecting wires running into outh-street, Philadelphia, with the main current. w, general superintendent of the company, who he wires immediately after the accident, said the had apparently been cut, and the young man had een attempting to splice the "cut-out" so as to e current. The "cut-out" the superintendent is a piece of wire several feet long, the ends of pliced to the main wire when a connection is to be acts as a safeguard when the main wire is cut ends, the current being at once diverted into the There is a systematic way of proceeding about nnections, he said, and the linemen are called onthly, and expressly cautioned not to follow any od. The cut-out is first put in place and then the may be cut with comparatively little danger. In owever, he said, it seems as if the main wire had ut, and an attempt to splice the "cut-out" made Nelson had been employed by the company and was regarded as a capable workman. He evious experience. Immediately after the shock crushing his head on the street. Dr. Formad, 's physician, made a post-mortem examination of yesterday. He afterwards said that, whilst the e fall was sufficient to have caused death, the man tedly been killed instantly by the electric current. were badly scorched, he said, and as in the three r cases, the corpuscles were disintegrated and the decomposed.—*Public Ledger.*

NEW NORTHERN STEELWORKS.—We understand that a firm of ironmasters in the county of Durham have decided to add a large steel-making plant to their establishment, and that it is probable that the basic open-hearth process will be adopted thereat. The site for the works is now being prepared; the plans are being perfected; and arrangements for the purchase of machinery are in progress. The eminence of the firm who commence the works, and the largeness of the enterprise will give interest to the full announcement which will shortly be made.

OUR COPPER COINAGE.—The penny (from the Danish *penge*, money) of Anglo-Saxon days was of silver, and represented the 240th of a pound weight of silver; but this dwindled down until it became too small to be useful or convenient, and was finally abolished by Charles I. Copper money was first issued by Charles II., but was not made current. In 1797 the first copper penny as a legal tender was struck at Birmingham, weighing exactly one ounce, but the more recent pennies have become mere tokens, 240 to the pound sterling, about half their nominal value, and legal tender of twelve pence only. Up to 1816 the penny was not as it is now the 240th of 20s., but of 15s. 2d., of our present money. Twenty-four pennies are coined from 1lb. avoirdupois of copper. Halfpennies and farthings were not coined until the reign of Edward I., the penny previous to this being indented with a cross-mark like the shilling for fractional purposes. Silver farthings ceased to be coined under Edward VI., and silver halfpennies under the Commonwealth.—*Longman's Magazine.*

YORKSHIRE COLLEGE EVENING CLASSES: DYEING DEPARTMENT.—On Friday evening, the 14th inst., the introductory lecture in connection with the evening classes held in the dyeing department, was given in the Yorkshire College by Professor Hummel. The subject of the lecture was "The life and work of John Mercer, an eminent Lancashire textile colourist." Mercer, said the lecturer, was a man who, by dint of his own perseverance and industry, had raised himself from the position of a poor weaver to one of eminence and honour, not only among business people, but even among the scientists of Europe. He was a contemporary of Faraday, being born in the same year, but under widely different circumstances. His education was of a limited character, though he owed a great deal to the instructions of a Government official who recognised the lad's abilities. Professor Hummel gave illustrations by experiments of several of Mercer's discoveries, the first important one he made, as to the application of antimony orange in calico printing, the manganese bronze style, the method of discharging indigo by means of red prussiate of potash and caustic alkali. It was also pointed out that the mode of steaming union goods, as at present generally adopted in the neighbourhood of Leeds, was the result of a visit paid by Mr. Reffitt, a well-known dyer, to the works at Openshaw, where Mercer was engaged. In conclusion, the lecturer said that Mercer, although engaged in practical work, found time to study theoretical questions. Although well known to calico printers, his introduction to public notice was due to his acquaintance with Dr. (now Sir Lyon) Playfair, the Member for South Leeds.

MORE PEPPER ADULTERATION.—Among the various modes of pepper adulteration which have recently come before the public, one of the commonest is the admixture of artificially rounded and coloured earth or stones to the berries, a mode of sophistication which can be practised with white as well as with black pepper. Parcels of pepper thus adulterated have, it is alleged, been repeatedly sold by a public auction lately, at a price so low as to render the *bonâ fides* of the buyers extremely doubtful.

THE SMOKE NUISANCE, EDINBURGH.—At a recent meeting of Edinburgh Public Health Committee reports were submitted regarding the smoke nuisance in the city. Prosecution was ordered in one case, and it was agreed to warn several other offenders. As this was the last meeting of the committee before the approaching municipal elections, Bailie Russell, the convener, was awarded a hearty vote of thanks for his untiring efforts in connection with the committee's work.

ILLEGAL USE OF METHYLATED SPIRITS.—At the County Petty Sessions at Tynemouth last week, Mary Smaldridge Johnston, who has drug shops at Byker, Wallsend, and Willington Quay, was summoned, at the instance of the Inland Revenue, for infringing the 130th section of the Spirits Act, 1880, by selling a certain article in the preparation of which methylated spirits had been used. Mr. E. Clarke, Newcastle, prosecuted, and stated that Mr. John Flint, supervisor, purchased half a pound of essence of pennyroyal, for which he paid 2s. 6d., at the defendant's shop at Willington Quay. It was found on analysis to be manufactured with methylated spirits instead of pure spirits of wine. Mr. C. W. Newlands, who defended, admitted the sale. Mr. Charles Proctor, F.I.C., Government analyst, proved the receipt of the sample from Mr. Flint. On analysis he found it to be an essence of pennyroyal, but it had been prepared with methylated spirits instead of pure spirits of wine. In answer to Mr. Newlands, witness said he would not swear there was no pure spirits of wine in the preparation. The price of half a pound of essence of pennyroyal, manufactured with pure spirits of wine, was 7s. 6d. Mr. Newlands having addressed the magistrates in mitigation of the penalty, a fine of £5 and costs was imposed.

LIVERPOOL COLOUR MARKET.—Colours continue unaltered. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White lead, £17. Red lead, £16. Oxide of zinc: V.M. No. 1, £19; V.M. No. 2, £18. Venetian red, £6. 10s. Cobalt: Prepared oxide, 8s.; black, 7s. 3d.; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto lb. jewellers, 1s. per lb. Drop black, 25s. to 28s. 6d. Paris white, 60s.. Emerald green, 10d. per lb. Derbyshire red, 60s. Vermilionette, 10d. per lb.

RIO TINTO MINING COMPANY.—The directors of the Rio Tinto Mining Company have issued their brief interim statement as to the operations during the current year. They state that the deliveries of pyrites under existing contracts have continued to be satisfactory, and indicate an amount of consumption for the whole year of fully 360,000 tons, against 347,000 tons last year. Pyrites contracts have also been concluded for consumption in this country during the next three years, which, taken along with the contracts for consumption abroad, promises a total delivery of about 400,000 tons per annum at the same prices for sulphur, and on the same terms and conditions as those now running. The production of copper at the mines is more than maintained. With the increase in this department the directors are able to intimate that the earning power of the Company is not less than it was last year, notwithstanding that the prices realised for copper have averaged £1 per ton lower. Since the annual general meeting arrangements have been made for the floating debt without the necessity of making any public issue, and within the powers of the Board under the statutes of the Company.

THE NEWCASTLE EXHIBITION.—It is announced that the Exhibition will be brought to a close on the 29th of the present month. A representation was made to the Corporation to take over the Exhibition building and transform it into a winter garden, but this offer was declined. The building, with all its fittings, comprising chairs, seats, turnstiles, etc., will therefore be disposed of by auction soon after the close of the Exhibition. A number of portable wooden structures erected on the Exhibition grounds will also be exposed for sale.

A SUBSTANTIAL REWARD.—New South Wales offers a fortune to any one who will devise a remedy against the increase of rabbits. The reward is £20,000, but the rabbit-destroyer is limited in his scope by conditions requiring immunity for the whole chapter of domestic animals. Under these circumstances it is more than probable that "Bunny" *will continue a plague.*

IRON CURTAINS.—The patentees, Messrs. Clar and Co. Limited, write that their hydraulic iron adapted for theatres, takes only twenty-three secon or lower, and that in France and Germany, where has received more attention than it has in this c authorities, acting on the advice of architects and have made it compulsory for every theatre to ha curtain.

LONDON SEWAGE AND FARM PRODUCE.—At t of the Greenwich District Local Board of Works nesday, the 5th inst., Mr. W. Andrews, its repres the Metropolitan Board of Works, said he wishe before the members a very important matter—t disposal of the sewage of the metropolis. Some ti resided at Tunbridge Wells, and prevailed upon t politan Board of Works to allow one of the farme have 10 tons of London sewage or sludge to plac land. That was the year before last, and the far pleased with it that he had since taken 400 tons. I used with the most satisfactory results upon l farmers said had broken their hearts. He (Mr. produced for the inspection of the members evening two specimens of mangold wurtzel, one size of a man's fist) raised with a fertiliser of costing £4 a ton, and another (as large as a m raised with pressed cake of London sewage, a specimen of wheat which produced 65lb. to the b with the finest and longest straw, which was grow London sludge, costing 8s. a ton—the sludge being thrown into the river Thames at the rate of 1 gallons a day, disinfected only with chloride of poisoning the water and the fishes. The Metropol of Works did not feel disposed to move in the utilising the sewage on farms, but when they saw men of wheat which had been grown upon it, they a chemist to go down to Tunbridge Wells, and them after the recess. It must be remembered t the pressed cake that was to be dealt with, and not in a crude state. By using that, the land would b and the pockets of the ratepayers saved.

DIAMONDS.—The export of diamonds from Kir the month of August amounted to £355,254.

FAILURE OF ANOTHER DIAMOND MERCHAN failure was announced at the London Bankruptcy week, of William Jardine, 19, Great Winchester-st diamond merchant, trading as Jardine and Co. presenting his own petition. The liabilities are about £80,000.

POLLUTION OF THE IRWELL.—At the Bury Co on Saturday, the 8th inst., before Judge Hutton, tion was made by the Salford Corporation for restrain the Local Boards of Radcliffe and Whit polluting the river Irwell with the sewage of the The case, however, did not proceed, the defenda agreed to an order to abstain from passing sewa river along any sewer or channel not made at the passing of the Rivers Pollution Prevention Act of to execute and complete within the next two years apparatus to render harmless all the sewage matte flowing into the river. The Judge signed the ord

WEST OF SCOTLAND CHEMICAL

GLASGOW, TUESDAY M

AN improvement in bleaching power is the m incident on the course of the past week's chemi the West of Scotland. As high as £8. 5s. has usual local delivery conditions, and this top fi spoken of; but of course, approved business is re at less money. Caustic soda, on the other han even added signs of weakness, although nominal the same as last week. Holders of sulphate c affect rather higher quotations, but it is ve whether much, or any, really representative b been carried through on stiffer terms than were the period covered by last report. Gauged b

inquiry for the article, which is not at all brisk, hand may be described as plentiful, and the of a genuine rise must be held as but little assured. kindred paraffin chemicals keep firm at former rtly owing to the still smouldering condition of the break, and makers here continue to talk hopefully to-American agreement some time past under con- for adoption. Bichromates hold late amendment, no additional gain, and much leeway remains to be particularly in the over-sea custom, stimulated as erms easier than those obtainable by either Scotch consumers. Saltcake of local make has recently for English consumption at 25s., freight free Run- e conditions proportionately more inducive than the command of the West of Scotland buyers. ral prices current are:—Soda crystals, 46s. 0d., ; alum, £4. 17s. 6d., less 2½ °/₀ Glasgow; borax, efined, £31, and boracic acid, £46, net Glasgow; 48/52°, 1d., less 7½ °/₀ Tyne; caustic soda, white, s., 70/72°, £7. 10s., and cream, 60/62°, £6. 5s., °/₀ Liverpool; bicarbonate of soda, 5 cwt. casks, 1 cwt. casks, £6. 5s., net Tyne; refined alkali, 7½ °/₀ Tyne; salt-cake, 22s. to 23s. f.o.r. Glasgow; powder, £8., f.o.r. Glasgow; bichromate of potash, d of soda, 3½d., less 5 and 6 °/₀ to Scotch and espectively; nitrate of soda, 8s. 10½d. to 9½d.; of potash, 6d., less 5 °/₀; sulphate of ammonia, to £11. 12s. 6d.; paraffin scale, hard, 2¼d., soft., 2d.; paraffin wax, 120°, semi-refined, 2⅞d. to affin spirit (naphtha), 7d. to 8d.; paraffin oil , 5d. to 5½d. to Scotch, and a fraction less to consumers; sulphate of copper, £13. 10s., less rpool. Clyde imports for week included 57,752 ar, and 1,185 barrels rosin.

THE TAR PRODUCTS MARKET.

LES remain much in the same state as at the date of eport; if anything, there is a tendency to firmness the small quantity offering. There was a good e of country tar distillers on 'Change at Manchester day, and it was rumoured that there were to be, e next few days, negotiations between some of the uyers and sellers, from which much good may be for the whole trade. The following values may be the prices of to-day:—90's, 2s. 9d.; 50/90, 2s. 1d.; 1¼d. to 1½d.; carbolic acid (crude 60's), 3s. 10½d.; e, 10½d. for B and 1s. 3d. for A quality. The r pitch is still black, and there seems to be no hope arket in the immediate future; there still remain sands of tons at Runcorn, almost unsaleable. Sales made of this product at 12s. London, and 12s. 6d. le all that can be obtained at Liverpool is 11s. 6d. fair business has been done during the past week, ports are neglected. The fact is that too much eing produced, and seeing that one large French as ceased to make patent fuel, the outlook is indeed All other tar products have advanced in price, but not only ceased to hold its own, but has actually

E SULPHATE OF AMMONIA MARKET.

arket is decidedly dull, and prices all round are ull being quoted at £11. 10s. to £11. 11s. 3d., at £11. 12s. 6d., and Leith at £11. 6s. 3d. to 6d., while Beckton price is still £11. 15s. During few days very little has been offering at Hull, but shipments have been considerable, leading people at the cry raised in Scotland during the summer, reduction, owing to the strikes in the shale-oil trade, ttle foundation in fact. Sulphate is now a pound er than it was this time last year, and it remains makers themselves whether prices shall recede

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

13627. H. KENYON. For improvements in the production of illuminating gas, ammonia, and other products and in apparatus therefor. October 8.

13647. C. HEINZERLING. For a process for separating chlorine from gas mixtures. October 8.

13648. C. HEINZERLING. For improvements in a furnace for decomposing chlorides of metals. October 8.

13660. S. E. GUNYON. A communication from T. Tournayre, of France. For new or improved colouring matters, and methods or processes for the preparation thereof. October 8.

13693. G. TRIER. A communication from C. R. Poulsen, of Denmark. For apparatus for producing ozone. October 10.

13695. C. HUGGENBERG. For obtaining nitrites, chromates, manganates, permanganates, and areseniates. October 10.

13730. T. G. HART. For improvements in explosives for use in fire-arms. October 11.

13746. B. J. B. MILLS. A communication from T. B. Fogarty, of United States. For a process of and apparatus for manufacturing ammonia. October 11.

13747. B. J. B. MILLS. A communication from T. B. Fogarty, of United States. For a process of and apparatus for producing sulphate of ammonia. October 11.

13839. A. G. SALAMON. For improvements in the treatment of benzoyl sulphonic imide (commonly known as saccharine). October 12.

COMPLETE SPECIFICATIONS ACCEPTED.

13073. A. PARKES. For improvements in extracting gold, silver, and other minerals, from ores or compounds containing the same. October 13, 1886.

14685. H. E. HARRIS. For improvements in the method of applying and manufacture of antiseptic, disinfecting, curative, and healing agents. November 10, 1886.

15488. W. BURNS. For improvements in the manufacture of sulphate of soda and bleach in one operation under high-pressure, and in the construction and use of apparatus for that purpose. November 27, 1886.

15498. W. BRAMLEY and W. P. COCHRANE. For improvements in treating solutions of chloride of calcium, so as to obtain chloride of magnesium and other products. November 27, 1886.

16118. H. KENYON. For improvements in the production of sulphide of zinc and chloride of ammonium. December 9, 1886.

16244. T. B. WILSON. For improvements in the treatment and purification of sewage and other impure liquids, and in the obtaining of fertilisers therefrom. December 11, 1886.

126. H. J. WALDER. For an improved process for the production of colouring matters from carbolic acid other phenols. January 4, 1887.

127. H. J. WALDER. For an improved process for producing colouring matter from anthraquinone. January 4, 1887.

4283. DR. A. DUPRÉ and C. N. HAKE. For improvements in the preparation of disinfectants, deodorants, and antiseptics. March 22, 1887.

OUR PRICE CURRENT.

[illegible] Higginbottom and Co., 116, Portland Street, Manchester.

[illegible] maker's works, or at usual ports of shipment in U.K. *The prices in different localities may vary.*

		£	s.	d.
[illegible]	per cwt.	0	10	3
[illegible]	per lb.	0	0	0⅞
[illegible]	per cwt.	0	12	9
[illegible]	per lb.	0	0	4¼
[illegible]	,,	0	0	5
[illegible]	per bottle	0	0	6
[illegible]	,,	0	2	9
[illegible]	per lb.	0	0	2¾
[illegible]	,,	0	0	2¼
[illegible]	,,	0	0	4
[illegible]	per ton	12	0	0
[illegible]	,,	4	5	0
[illegible]	,,	3	7	6
[illegible]	,,	3	17	6
[illegible]	,,	2	5	0
[illegible]	,,	1	15	0
[illegible]	per lb.	0	1	6¾
[illegible]	per ton	10	12	6
[illegible]	,,	4	15	0
[illegible]	per lb.	0	0	3½
[illegible]	,,	0	0	1¾
[illegible]	,,	0	0	3½
[illegible]	per ton	22	0	0
[illegible]	per cwt.	34/- & 32/-		
[illegible]	per ton	11	12	6
[illegible]	,,	11	11	3
[illegible]	per lb.	0	0	9¾
[illegible]	,,	0	0	8¼
[illegible]	per ton	35	0	0
[illegible]	per lb.	0	1	0
[illegible]	per ton	7	10	0
[illegible]	,,	4	0	0
[illegible]	,,	3	5	0
[illegible]	,,	7	12	6
[illegible]	,,	2	12	6
[illegible]	,,	12	5	0
[illegible]	per lb.	0	0	9
[illegible]	,,	0	3	9
[illegible]	[illegible] per cwt	0	1	3
[illegible]	per gallon	0	2	9
[illegible]	,,	0	2	1
[illegible]	per lb.	0	1	2
[illegible]	per gallon	0	3	10½
[illegible]	,,	0	0	1
[illegible]	,,	0	0	2
[illegible]	,,	0	1	1
[illegible]	per ton	1	7	6
[illegible]	,,	0	11	6
[illegible]	per gallon	0	0	1½
[illegible]	,,	0	0	2
[illegible]	per ton	39	15	0
[illegible]	,,	13	10	0
[illegible]	,,	36	15	0
[illegible]	per cwt.	1	15	0
[illegible]	per ton	33	0	0
[illegible]	,,			[illegible]
[illegible]	,,			[illegible]
[illegible]	,,			[illegible]
[illegible]	,,			[illegible]
[illegible]	,,			
[illegible]	,,			

		£	s.	d.
Lime, Acetate (brown)	per ton	9	15	0
,, ,, (grey)	,,	13	10	0
Magnesium (ribbon and wire)	per oz.	0	2	6
,, Chloride	per ton	2	5	0
,, Carbonate	per cwt.	1	17	6
,, Hydrate	,,	0	10	0
,, Sulphate (Epsom Salts) ...	per ton	2	10	0
Manganese Sulphate	,,	19	10	0
,, Borate	per cwt.	2	5	0
,, Ore, 70 °/₀	per ton	2	10	0
Methylated Spirit, 60° O.P.	per gallon	0	2	4
Naphtha (Wood), Solvent	,,	0	4	1½
,, ,, Miscible, 60° O.P. ...	,,	0	5	4½
OILS:—Castor	per cwt.	1	4	9
Cotton-seed	per ton	20	10	0
Linseed	,,	19	10	0
Lubricating, Scotch, 885°—890° ...	,,	6	0	0
Petroleum, Russian	per gallon	0	0	5¾
,, American	,,	0	0	5⅝
Silver (metal)	per oz.	0	3	8 1/16
,, Nitrate	,,	0	2	8
STARCHES:—				
Sago	per cwt.	0	8	9
Potato (farina)	,,	0	10	3
Sodium (metal)	per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀	per ton	5	0	0
,, ,, (Caustic Soda-ash) 48 °/₀	,,	3	18	9
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	2	6
,, ,, (Soda Crystals)	,,	2	10	0
,, ,, (Crystal Carbonate) ...	,,	5	6	3
,, Chlorate	per lb.	0	0	7½
,, Borate (Borax)	per cwt.	1	8	0
,, Bichromate...	per lb.	0	0	3½
,, Hydrate (74 °/₀ Caustic Soda)...	per ton	8	2	6
,, ,, (70 °/₀ Caustic Soda)...	,,	7	7	6
,, ,, (60 °/₀ Caustic Soda, white)	,,	6	7	6
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	2	6
,, Bicarbonate	,,	5	17	6
,, Hyposulphite	,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	9	1½
,, Silicate (glass)	per ton	5	10	0
,, ,, (liquid, 100° Tw.)... ...	,,	4	7	6
,, Sulphate (Salt-cake)	,,	1	2	0
,, ,, (Glauber's Salts) ...	,,	2	2	6
,, Sulphite	,,	5	15	0
Potassium (metal)	per oz.	0	3	10
,, Bichromate	per lb.	0	0	4½
,, Carbonate, 90%	per cwt.	0	18	0
,, Chlorate	per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ...	per ton	22	10	0
,, Nitrate (refined)	per cwt.	1	2	0
,, Prussiate Yellow	per lb.	0	0	7½
,, Sulphate, 90 °/₀	per ton	9	15	0
,, Muriate, 80 °/₀	,,	8	10	0
Strontium Hydrate, 98 °/₀	,,	7	0	0
Sugar, Beet	per cwt.	0	11	9
,, Cane	,,	0	16	0
Sulphocyanide of Barium	per lb.	0	0	6
,, Ammonium	,,	0	0	9
Sulphur (Flowers)	per ton	9	5	0
,, (Roll Brimstone)	,,	5	17	6
Superphosphate of Lime (28 °/₀)	,,	2	0	0
Tallow	,,	22	10	0
Tin (metal)	,,	109	10	0
Crystals	per lb.	0	0	7
(Spelter)	per ton	15	15	0
Chloride (solution 96° Tw.)	,,	5	15	0

Chemical Trade Journal,

TURDAY, OCTOBER 29, 1887.

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TO ADVERTISERS.

AL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

irst week of the approaching New Year we shall **PECIAL NUMBER** of the **Journal.** We pro-ng our first volume to a close with the last Saturday ber, 1887. The issue of January 6th, 1888 (No. 33), ence Volume II. It will be an enlarged special very general interest. We shall issue along with **-page** and **Index** for the first volume, together t and useful **Office Almanac,** suitable for our s, which is now in course of preparation.

g our regular subscribers, our New Year's Number ued to **NOT LESS THAN 10,000 FIRMS AND UALS,** so that intending advertisers will see at this issue is worthy of their special attention.

y explain that in our Publishing Department, we ry carefully compiled lists—in most cases the result knowledge and information at our command—of of repute, both at home and in the main trading road, connected with the various industries whose t is our province to serve. We utilise these lists week, by selecting a number of them in turn, and ut free copies of the Journal to those firms who yet become annual subscribers. *The result is that ry day brings us a fresh batch of subscribers.* We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of the New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO,** numbering altogether, as we have stated, not less than **10,000** names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

THE BLEACHING POWDER CONVENTION.

THE manufacturers of bleaching powder met last week in secret conclave to consider the continuance of the convention, with all the former pains and penalties, and have agreed to continue the restricted production for another year. It will be seen, therefore, that bleaching powder manufacturers are tolerably secure as to price for all 1888, unless the production of new works seriously influences the market, in which case the executive committee of the convention have power to reduce the price to £3 per ton, if necessary. This is one way of quenching the smoking flax of free-trade production; but sooner or later, those Leblanc makers who are now enriching themselves by mutual consent—if not mutual goodwill, must again pass through the fire of competitive prices and the weakest will go to the wall. The laws of Political Economy may be evaded for a time by a combination of individuals bent on upsetting these laws, but in the end they are inflexible in the selection of the fittest, and when the ordeal has been passed through the trade, as it then exists, will breathe more freely, and in a purer atmosphere than it does now.

During the remainder of this year the thousand tons which the Metropolitan Board of Works has to sell must be reckoned with, for it will certainly affect the market, unless the combined manufacturers make 1,000 tons less during November and December in the present year; and next year there is the unauthorised production of the new works in St. Helens, which it is understood has sold at a good price the whole of its production for next year.

But if rumour be true, there is not to be much consolation for the followers of the Leblanc process. It is said that the old Prestolee works at Farnworth, near Bolton, are to be started again by a Lancashire Company of Consumers who desire to share in the profits of the trade they are now helping to enrich. People who know but little of a trade they are about to engage in often make egregious blunders,—the mere existence of old-fashioned plant placed in a bad situation does not make a successful chemical works. It is doubtful whether the works in question would be cheap at any price, the situation is certainly against it, unless a sulphur recovery process renders pyrites a secondary consideration. This is possible, may be probable, and then the position would not be amiss if the plant was properly put down for economical and efficient working. And herein lies the secret of future success or failure in the Leblanc alkali trade: those who ought to be in a good position to judge think there is no need to fear the ammonia soda process as a supplier of hydrochloric acid or bleaching powder, and that it will be a long time before Mr. Mond succeeds in placing the necessary 100 tons weekly of bleach upon the market with which to seal the doom of the old process.

The Bleaching Powder Convention has now been made to include chlorate of potash also, and it is understood that the present production of chlorate of potash is not to be increased unless there be a corresponding reduction in the make of bleaching powder. For these products the Leblanc process still holds the field, and it is a moot point whether a new works built on modern lines and managed on scientific principles could not assert its supremacy under the most severe competition and free-trade prices.

THE ANALYSIS OF TRADE PRODUCTS.

II. STANDARD SOLUTIONS.

CHEMICAL analysis (quantitative) may be divided into volumetric and gravimetric; in the former the various quantities of the active ingredients are measured by means of solutions of known strength; while in the latter the substances requiring to be determined are precipitated in some form or other and directly weighed. Volumetric analysis is capable of extreme accuracy, but as all depends upon the care with which the standard solutions are made up, the student is advised to spare no pains in making them absolutely accurate. We shall indicate very fully how they all are to be made and tested, and we may remark here, that on no account may any of the operations be conducted in a slovenly manner; to be exact in volumetric analysis demands that sufficient time and attention shall be devoted to the work in hand.

In all volumetric operations it is necessary to have a starting point, or a solution, with which all other standard solutions will compare; such a solution must be made with the greatest care, as it will be seen that any error in the starting point or standard will be perpetuated throughout the series. Pure carbonate of soda solution is the one we shall fix upon as our first solution, so that its counterpart, a sulphuric acid solution, may be prepared for testing soda-ash and caustic soda.

Normal Carbonate of Soda Solution.—Pure carbonate of soda may now be obtained from dealers in pure chemicals, or from the manufacturers, such as Messrs. Harrington Bros., of Cork. Great care must be taken to get this salt pure, as we have known several instances where a common quality has been foisted upon beginners. Messrs. Harrington's make may be depended upon, and the parcels post brings their wares within the reach of everybody. They have an excellent case of products at the Manchester Exhibition deserving of attention on the part of analytical chemists. Sixty grammes of this pure carbonate of soda should be taken and heated over a large Bunsen burner, to redness, either in a platinum crucible or in one of nickel, which answers very well for alkaline substances. After heating to redness, the crucible should be placed in a desiccator (*Chemical Handicraft*, fig. 1,287) over sulphuric acid until it is thoroughly cold. Fifty-three grammes are then to be weighed out quickly and carefully, and placed in a large beaker, about half a litre of distilled water added, and the whole stirred until dissolved. When all the carbonate has dissolved in the cold, add about 400 cubic centimetres of water of such a temperature as will bring the whole to 15·5° C. (60° F.), transfer to the test mixer (fig. 2,790), rinse out the beaker with 50 cubic centimetres (c.c.), add it to the test mixer, and finally make it up to one litre exactly. This solution will not be used often, and should be very carefully kept. We have found the best way to preserve standard solutions of the alkalies is to keep them in a Winchester, the stopper of which has been removed, and its place occupied by an indiarubber stopper. The neck of the bottle may be kept clean by placing over it an inverted beaker of 140 c.c. capacity.

Normal Sulphuric Acid.—Take 700 c.c. of distilled water in a large beaker, and add to it with constant stirring 80 c.c. of the best rectified oil of vitriol made from brimstone. Great heat will be developed, and the mixture should be set aside to cool. When the temperature has fallen to 15·5° C (60° F.) make the quantity up to two litres with distilled water.

The solution has now to be made of such a strength that y given volume of it will *exactly* neutralise the same ume of the normal carbonate of soda solution. This is omplished in the following manner:—Take 100 c.c. of l carbonate of soda solution and place in a k, colouring the solution with a few drops of for the preparation of which see further on. c.c. of the sulphuric acid solution, and heat to w minutes over a Bunsen burner, then add ne of the burettes (No. 2,697) in quantities until a reddish-blue colour appears; then boil, which will probably result in the full returning; should the blue colour return, add the a few drops at a time, boiling after each additic colour after boiling is neither red nor blue. The the solution is neither alkaline nor acid is show peculiar tint in the litmus, and after a little student will be able to stop at this exact poin nicety.

When the amount of acid required to neutralise of normal carbonate of soda solution has been exactitude it should be noted down; it will 85 c c.; let us call it 85·2 c.c. This 85·2 c.c. wil diluted to 100 c.c. or 852 c.c. to a litre befo equivalent to the carbonate of soda solution. T must therefore be placed in the test mixer (fig. 2 very carefully measured, and made up to one li titration has been well performed, the normal su will be equivalent to the normal carbonate of sod *drop*; but after making the dilution its accurac be taken for granted, but the experiment repeate say 50 c.c. of the normal carbonate of soda sc adding the litmus and acid as before. Exactly 5c normal acid should be required, *to a drop*.

Normal Caustic Soda Solution.—What is commerce as 70 °/₀ white caustic soda is good most purposes of volumetric analysis, but as t small quantities of sulphates and chlorides, it that pure caustic soda should be alone used some keep in our laboratory two normal solutions of c one made with 75 °/₀ caustic of the Greenbank pany, St. Helens, and another of pure caustic so and sold by the Magnesium Metal Company, at near Manchester; it is made by them fro sodium.

Let the student take 100 grammes of 70 °/₀ w soda and dissolve in a litre of distilled water; make up the volume to two litres. This mu standardised. For this purpose put 100 c c. of sulphuric acid into a beaker, and colour with a f litmus solution as before; now run in the causti tion, and stop the moment the litmus changes col to the absence of carbonic acid, the end of the very sharp and definite. There is no need to b tion in this case, as there is no carbonic acid to us suppose the 100 c.c. of normal sulphuric aci 93 c.c. of the unstandardised soda; then it is 93 c.c. would require making up to 100 c.c., or 9 litre. This is to be done in the test mixer; carefully measured in and distilled water added the litre. After dilution, 50 c.c. should be ag to ascertain if the dilution has been accurately Very great pains indeed must be taken over the of the three foregoing standard solutions, and on must they be put on the shelves as finished until the acid will exactly neutralise 100 c.c. of eit alkalies.

Litmus Solution.—Take 20 grammes of lit finely powder them in the mortar, and digest w methylated spirit for twelve hours; filter, and residue on the filter into a beaker, to which add distilled water; digest at a gentle heat for twelv allow three days to settle; decant off the clear l the sediment, filter the decanted liquor, and eva water bath (fig. 1,248) to 50 c.c. When thus co add dilute nitric acid (one of acid to five of wat drop until the colour has changed to a redd Transfer to a smaller dish, and evaporate to dry water bath, or rather to a pellicle; after cooling, the pellicle with a sharp knife or spatula (fig. 99 serve in a bottle for use. When litmus solution i dissolve half a gramme of this pellicle in 50 c.c. water.

Distilled Water.—Steam-water condensed fro in ordinary works is often very impure; a small pipe should be connected from the *top* of the with a small worm of pure tin, standing in a

, and the condensed water collected in a salt-glazed ware vessel of twenty gallons capacity, fitted with a ware cover, and containing a glass tap at its lower end.

(To be continued.)

GAS-TAR AND ITS USES.

V.

BURNER for liquid fuel was devised many years ago by ainte-Claire Deville for use on board steam vessels and comotives, and it was said to be very effective, though its id not increase owing to various causes. The oil was ed to flow by means of several pipes on to a brick slab arth, the air supply being admitted just where the oil entrance, by means of a perforated door in which the pply could be regulated by means of a slide in the frame. ently in its original form such a burner is not well ted to the use of tar as fuel on account of its viscid acter, and also because during the first part of its com- on coke is formed, together with large quantities of other naceous matter, which would certainly choke a burner is pattern. It was devised for the purpose of burning al oils only, and for such the development of steam was ctly under control without the production of black smoke. e have made some very careful experiments with Mr. ge Anderson's fireplace and are thus able to state posi- the heating values of various fuels which may be ned in practice with due care and attention. In this of experiments, three boilers were set in one range and ected to the same chimney, the damper being situated in ain flue leading from the three boilers. One of these rs was always off for cleaning, the two others being kept ll work. One boiler of this range was fed continuously various liquid fuels, tar, creosote, and naphthalin salts; the other was fired, first with gas (coal gas), then with and lastly with coke. The firing with liquefied naphtha- lts soon had to be discontinued on account of its intense the flame was short and fierce, and more applicable to elting of steel than to firing steam boilers. In creosote ar there did not seem to be much difference, except that ote did not require so much attention and was more ly, the practical heating power of each was exactly ar. Steam was of course easily raised with coal, but coke (gas-coke) was substituted there was at first as difficulty in its use as with liquid fuel. Coal requires a rately thin fire, while coke demands a very thick fire; until this was properly recognised by the fireman in e no progress was made. Moreover, there was a very difficulty in getting the firemen to work with a minimum ught, the appearance of the fire is so different with coke it is not easy to persuade a practical man that both kinds oing the same amount of work. However, after a long of experiments, extending over many weeks, during the one boiler was fed with liquid fuel at the rate of gallons per twelve hours without a particle of solid fuel employed with it, the fact was established that under best conditions the following quantities of materials ued equal heating values :—

Coal	1456 lb.
Coke	1624 lb.
Gas	25,000 cubic feet.
Gas-tar	76 gallons of 1180 sp. gr.
Creosote	77 gallons of 1080 sp. gr.

ratio in these experiments turned out 1·81 of coke to of gas-tar, and in working retort furnaces even this can ceeded owing to the passage of the gases through the el flues. Our best experiments were 1·86 to 1·0, so that should be no difficulty in realising a value of 1½ tons a-coke for every ton of gas-tar consumed.

e can now form an opinion at any moment whether it better to sell tar or to burn it, and in order to put before readers the exact price which should be realised for tar, coke fetches certain values, we give the following table, at every gas manager may see for himself what his tar ld produce. If he can get more than this by selling it it is clearly his duty to sell, if otherwise, it is clearly his duty to burn it as fuel:—

Coke Value.	1·86 Basis. Value of Tar as Fuel.	1·5 Basis. Value of Tar as Fuel.
s. d.	s. d.	s. d.
3 6	6 6	5 3
4 0	7 5	6 0
4 6	8 4	6 9
5 0	9 3	7 6
5 6	10 2	8 3
6 0	11 2	9 0
6 6	12 1	9 9
7 0	13 0	10 6
7 6	13 11	11 3
8 0	14 10	12 0
8 6	15 9	12 9
9 0	16 8	13 6
9 6	17 7	14 3
10 0	18 7	15 0
10 6	19 6	15 9
11 0	20 5	16 6
11 6	21 4	17 3
12 0	22 3	18 0
12 6	23 2	18 9
13 0	24 2	19 6
13 6	25 1	20 3
14 0	26 0	21 0
14 6	26 11	21 9
15 0	27 10	22 6

Although the foregoing experiments were conducted with a steam boiler, we do not think the method of firing with tar on Mr. Anderson's principle would be suitable for ordinary Lancashire or Galloway boilers. Those with which the experiments were made were of the double-cylindrical type, with a large and solid brick fireplace, so that with a baffling wall the combustion was fairly complete before the gases left the furnace. In any boiler where the partly burned gases came in contact with cold or comparatively cold iron, we fear this method would prove a failure owing to the formation of soot, which would be sure to corrode the boiler surface and cause much black smoke to issue from the chimney top. If tar is to be tried with internally fired boilers, it must be employed in connection with steam or compressed air, the former of which we shall describe in our next article.

(To be continued.)

RIVER POLLUTION.

II.

THAT bleaching works do cause a very large amount of pollution we have often had ocular demonstration, and we have in our office a very interesting set of samples taken at various periods of the day from a works that is connected by a private drain with the river Irwell, which we shall be pleased to show to any doubting minds.

It is well known that the goods submitted to the bleaching process are often heavily laden with size, composed of many organic ingredients, together with such chemical substances as chloride of magnesium and chloride of zinc. The goods are first boiled with lime, and this "lime-stew" takes away all the size and chemicals which are thus removed from the cloth. Where, we ask, does all this size go to? We are afraid the only answer is the river. Why should the river be made the common receptacle for such refuse as this? Then, after the lime-stew, comes the "bowking" with soda-ash; the cloth is boiled up with a weak solution of soda-ash for some hours, after which the "kier" is let off. What is this operation of "letting off? Will anyone venture to say that it is not the process of running into the nearest "sough" which communicates with the nearest river or stream, on or near which the works are situated? The waste lime-stew, and the waste soda from the kier may, in some people's opinion, be very good for the river, but if so why do bleachers as a rule take such care to keep it out of their lodges or reser-

voirs; if it does no harm to the river, why not run it into the lodges for use over again? In the best interests of the public we say that such substances as these should never have been allowed to find an entrance into the river; had the practice been prohibited at the outset, manufacturers would long ago have found methods of dealing with them. Up to this point we have only considered the lime and soda-ash impurities, and these are quite sufficient to cause a very sensible pollution; it is true that the soda-ash solution does not stand at more than 3° or 4° Tw., but this is quite enough to kill water weeds and to destroy fish.

Just a word to those who have the prevention of the pollution of our rivers at heart. There is a very good practical test as to whether an effluent is fit to find entrance into a stream, it is in use on one large river with which we are acquainted, and answers admirably; it needs no chemical analysis with its confounding interpretations, no estimation of organic nitrogen or organic carbon, it is simply this:—The river inspector carries with him a small can of water containing living minnows or sticklebacks, together with an empty can which slides over the other for portability; when he sees any liquid running from a works into the stream—and in this case the river is inspected from a boat—he catches a canful and drops in two or three of the small fish; if the fish live in the water for half an hour it is considered good enough for entry into the river. To those who aver that bleachworks do not contribute anything that may be considered a serious pollutant we earnestly recommend them to try this simple experiment with waste "kier" liquor.

The foregoing substances are, however, not the only ones used by bleachers, there is the bleaching powder or bleaching liquor, one of the most noxious materials which it is possible to put into a stream, so far as animal and vegetable life is concerned. It is well known by fish-poachers that a small quantity of "bleach" sewn up in a canvas bag and thrown into a pond will bring up dead the whole of the fish in a single night.

We may possibly be met by the argument that the bleach is not, as a rule, run off into the river as the soda-ash kiers are; but the solution is again strengthened up and continually used. Our reply must be, and it is tempered by actual experience in a bleachworks, that this fortifying does not go on for ever, and that sooner or later, when there is but little virtue left in the "chemick," as the solution is termed, it is turned down the sough along with the other abominations. We happen to know the quantities of soda-ash and bleaching powder used in several bleaching establishments, and we can inform our readers that the weight of such matters weekly sent into the river amounts to some tons.

We have not done yet with the list; there are the "sours" the technical term given to the dilute acid used in the bleaching process. This acid may be muriatic, or it may be sulphuric or oil of vitriol. From time to time, when they have become so charged with lime salts and other impurities, these sours are let down the river also. Try the fish test with these spent sours and see how the fish will stand it.

That all these substances we have mentioned are run in from bleachworks may be easily demonstrated to anyone who chooses to call at our office. If an outlet be watched for a few hours, the effluent may be seen to change almost every half hour; at one time a stream of dilute acid, at another of weak bleach, at another of weak soda-ash, interpolated at times with gushes of purple and blue to give variety.

Many of these works prepare their own wheat-starch for finishing; enormous quantities of wheat flour are mixed with water and set aside to ferment; during this time the magma becomes acid and the gluten is dissolved. What becomes of this gluten, this highly nitrogenous and decomposible organic body? Answer again, the stream.

That the effluents from bleaching works are noxious to vegetatio[illegible] a largely diluted is well-known in certain [illegible]arters [illegible] a large bleaching centre; the sewage [illegible] the [illegible] taken out of the river and used for [illegible] way [illegible]e Town Council strongly prohibit the [illegible] sewers of any manufacturing refuse [illegible] [illegible]e done with the sewers in Barnsley, it should be possible with the Irwell in Lancashi[illegible] hope the Salford authorities will persevere in their [illegible] clear out this Augean stable, and to render the [illegible] less unsightly and more healthy.

We have been encouraged to speak out thus [illegible] order that those in authority, whether they be t[illegible] our municipal departments or whether the lead[illegible] manufacturing concerns, may know the extent of th[illegible] complained of; there have been attempts to greatly [illegible] the amount of pollution now going on, ascribing [illegible] the pollution to sewage, but as we believe that [illegible] other, and the sooner the better, manufacturing [illegible] have to be taken into account as being the great[illegible] purpose following up this series of articles by de[illegible] detail the pollution produced by a variety of o[illegible] situated on the Irwell and other manufacturing str[illegible]

(To be continued.)

Our Book Shelf.

ALUMINIUM. By Joseph W. Richards, A.C.; 3[illegible] 16 engravings. London: Sampson, Low, Searle, and Rivington. 1887.

The first public display of a bar of aluminium [illegible] size was made at the Paris Exposition of 1855 after this (1858) Tissier Frères wrote and publ[illegible] treatise, "Recherches sur l'Aluminium." In t[illegible] between this and the next Paris Exhibition of [illegible] manufacture of this metal had become considerab[illegible] in France, so that at the latter Exhibition it migh[illegible] seen in a variety of forms, as metal, and in m[illegible] goods, and also alloyed with copper under th[illegible] "aluminium bronze."

The manufacture of aluminium was, and is [illegible] essentially a French industry, and, moreover, i[illegible] one from which much was expected; it was th[illegible] surprising that the Emperor Napoleon III. [illegible] interest in such a manufacture, and that it formed [illegible] of one of the series of popular lectures in 1867, [illegible] Asile Impérial de Vincennes under the patro[illegible] Empress. The lecture was delivered by Prof. Fel[illegible] of the Ecole Turgot. The publishing of this lectu[illegible] to popularise the idea that aluminium was the [illegible] future *par excellence*, and though it was well [illegible] England in 1868, yet it was never translated, no[illegible] any fruits in the way of producing a treatise o[illegible] facture of aluminium in the English language.

Twenty years have passed and gone, and [illegible] metallurgist of American nationality has filled [illegible] space in our literature. To those interested in a[illegible] and there appears to be an increasing number-[illegible] mend the perusal of this treatise of Mr. Richa[illegible] only does he give a *resumé* of all the old method[illegible] facture, but brings the processes down to the pres[illegible] is a complete history of aluminum which those [illegible] they have invented or discovered new process[illegible] well to study. We are much pleased with the [illegible] way in which the work has been compiled. In t[illegible] occupying to page 41, is the history of alumini[illegible] time of Lavoisier to that of the introduction o[illegible] electric furnace. Part II. treats of the occurrenc[illegible] nium in nature. Parts III. and IV., treating of [illegible] and physical properties of the metal, are very v[illegible] will save much search in chemical and metallur[illegible] Part V. describes the metallurgy of aluminium [illegible] treats of the manufacture of sodium in a mo[illegible] manner, though it can scarcely be said to indicate [illegible] method of working. Part VII. details the ma[illegible] pure alumina, Part VIII. the preparation of [illegible] chloride of aluminium and sodium, while Part [illegible] very good account of the manufacture of alumi[illegible] works of Messrs. A. R. Pechiney and Co. at S[illegible] successors to Henry Merle and Co.

s far the treatise before us is chiefly of interest to the al man, but Chapter X. will be eagerly scanned by nventors who do not grudge time or money in seeking w methods for manufacturing aluminium. This chapter of the reduction of aluminium by other reducing agents odium, notably cyanogen, hydrogen, carburetted gen, lead, carbon and its oxides, zinc, manganese, and, all, by electricity.

last two Parts, XI. and XII., are devoted to "Work- Aluminium" and the "Alloys of Aluminium," follow- th an appendix and addenda, bringing in information late in 1886. The treatise is most complete of its and Mr. Richards has left no excuse for the appearance other work on aluminium until at least some new pro- not herein described, shall have revolutionised the facture.

E OF MAN MINING COMPANY.—The thirty-fourth l meeting of the shareholders of the Isle of Man Mining any was held at Chester on Tuesday, the 11th inst., the man, Mr. John Beckwith, of Rock Ferry, presiding. In g the adoption of the annual report, the chairman said sult of the year's work had been satisfactory in almost way; perhaps, however, not so much in respect to s, which showed a decrease of about £1,800 compared the previous year, and that, too, on an increase of 266 f ore raised. This decrease was explained by the fact the price of the ores during the past year had been os. 6d. per ton as against £10. 13s. 6d. in the pre- g year, making a difference of about £2,828 in the year's ns. The directors recommended a dividend of 12 per which would leave rather a small balance, but, in the nt satisfactory position of their mines, and with their reserves, that was a matter of very little moment. The l was adopted.

CK-MAKING PLANT FOR JAPAN.—We learn that rs. Bradley and Craven, Wakefield, have just sent out pan a plant capable of producing 10,000,000 bricks per Drawings and specifications for the erection of the known Hoffman Kiln, capable of burning the above ly, have at the same time been sent out by the firm.

INFRINGEMENT OF THE PETROLEUM ACT.—John Beckestone, of High-street, Aston, has been summoned for keeping two gallons of benzoline, a product of petroleum, in an improper vessel, contrary to the Petroleum Act, and without being licensed.—Richard Price, inspector of explosives, stated that on the morning of the 1st inst. he saw the defendant in charge of a cart in Aston Brook-street. Defendant's cart contained a barrel of petroleum and a two gallon can of benzoline. The Act of Parliament provided that benzoline should only be kept in pint vessels of glass, earthenware, or metal. Defendant could have sold the petroleum had he held a hawker's license.—The Bench inflicted a fine of 20s. and costs, and ordered the can of benzoline to be confiscated.

BURNING ACCIDENT.—Last week an accident occurred at the Sun Foundry, Alloa, whereby two men were severely burned. It seems that work had been a little behind at one of the furnaces, and in order to accelerate the heating a quantity of naphtha was poured into the cupola, with the result that the flames burst out from the top with great fury, seriously burning the faces of James Godfrey, foreman moulder, and Andrew Sutherland, furnaceman. Oil was at once applied to the burns, and the men conveyed to the house of Dr. Milne, who at once attended to the injuries. The unfortunate men were then removed to their homes.

WATER-GAS.

IV.

THE scientific fact mentioned on page 130 is the occurrence of siliciuretted hydrogen in the water-gas. This is formed during the time of gas-making, and more especially at the commencement, when the water-gas is absolutely free from carbonic acid and steam. At this period it is so strongly present that the gas flame is coloured by it a strong orange yellow. In proportion to the water-gas containing more carbonic acid the siliciuretted hydrogen becomes separated into silica and hydrogen, the first of which forms a fine white mist finally depositing, partly in the scrubber, partly in the gasholder, and also in the purifying boxes. What the amount of siliciuretted hydrogen is has not as yet, we believe, been determined, but under any circumstances it is but very small.

The apparatus in use at Messrs. Schultz, Knaudt, and Co., at Essen, is of very large size, as not only is the water-gas used for metallurgical purposes, for which it is admirably adapted, but it is employed also for lighting up the works, about three hundred burners being installed for ordinary illumination. A demand has, however, arisen for smaller producers, both for furnace work as well as for use in lighting; therefore it soon became necessary to devise an apparatus having a producing power of 50 cubic metres per hour, or roughly, 2,000 cubic feet. With such a small apparatus the greatest simplicity was necessary, so that the practice of superheating the steam and the use of a blast of air under pressure was for the first time ignored.

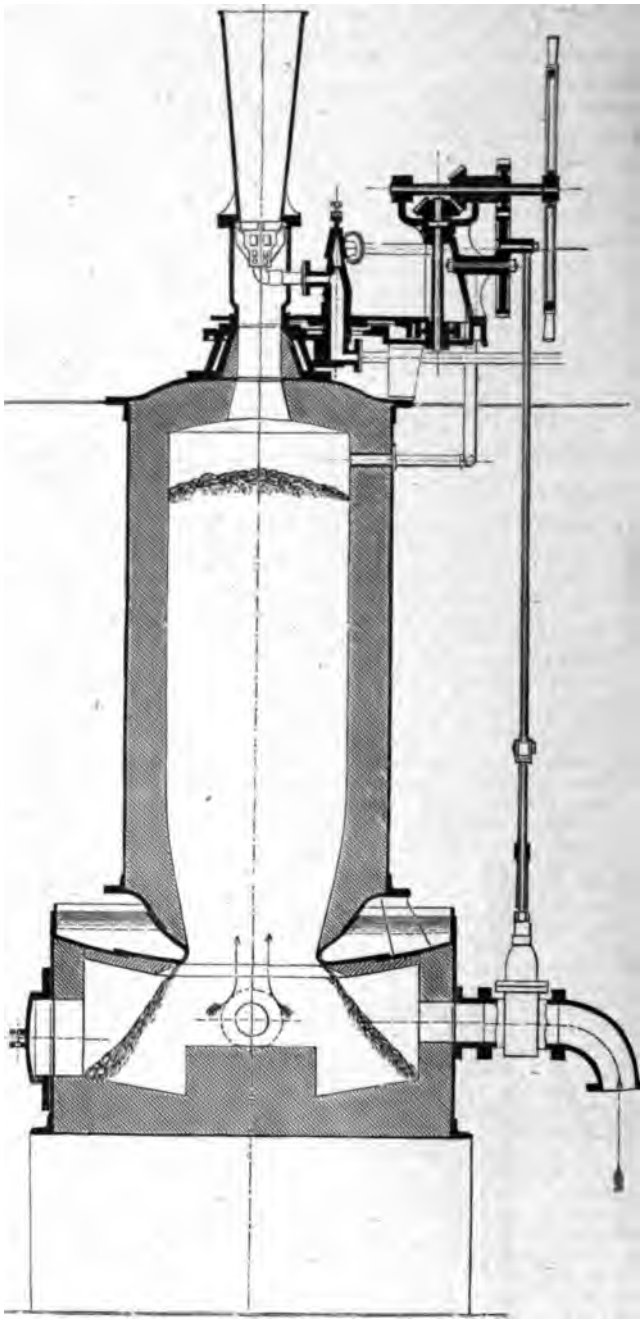
It may be as well to state here, that the English agency for the exploitation of the designs of the European Water-Gas Co. has been entrusted to the care of Mr. A. Wilson, the gas furnace engineer of Stafford, who has fitted up one of these 2,000 cubic feet per hour producers at his works, where it may be seen. A view of the plant there erected is shown by the accompanying illustration. It consists of a generator about 3 feet 4 inches in external diameter, a small washer scrubber, purifiers, and a gasholder. These accessories are of course only requisite when the water-gas is used for purposes of illumination, otherwise the purifiers are not necessary, though it may be useful to employ the gasholder. In this small apparatus the necessary draught is produced by means of

a Körting's steam-jet exhauster, and by this means it is impossible that air can ever enter into the holder through the hydraulic seal of the scrubber, an eventuality having to be specially guarded against by the employment of a special valve, when a plenum is obtained during the hot blast. There is also another advantage to be gained by the use of the vacuum air supply, and that is, that the clinkering of the furnace can be performed without interrupting the working of the furnace.

The sectional illustration here shown will enable the reader to form a very good idea of the construction of the apparatus for producing 2,000 cubic feet of water-gas per hour. The same opening in the producer proper serves for charging, as well as for a chimney. In a plate, which by means of a hand-wheel is revolved round a fixed centre, there are three openings; in the first there is the chimney with Körting's steam-jet exhauster, in the second a filling funnel for charging the fuel, and in the third a closing cover. The fixed centrum is constructed as a double-cock or valve, in such a manner that on turning the plate, steam enters either into the steam-jet for suction or into the tube conduit for gas-making; and, on the other hand, when the charging funnel is over the opening, the steam is shut off altogether. The man in charge has therefore only to turn the hand-wheel to the right or to the left, in accordance with the interludes determined according to experience or analysis, in order to keep the apparatus properly working.

With coke containing 15 per cent. of ashes and 5 per cent. of water, 1,000 cubic feet of water-gas requires 198 lb., that is when constantly worked night and day. If worked by day only then there must be reckoned that quantity which is uselessly burnt at night. The water used in cooling is about 750 gallons per twenty-four hours, and of course water is also allowed to run during the night when no gas is being made. The scrubber alone requires about 40 gallons of water per hour.

The generator gas produced during the period of the hot blast — ten minutes, as against five minutes for gas-making — is in the apparatus illustrated lost, but there is clearly nothing standing in the way of utilising the same under a steam boiler for the generation of the steam required. Where water-gas is produced in large quantities it is clearly wrong to allow the generator gas to escape uselessly into the air and a number of uses are open for it, whether for smelting or heating, either alone or mixed with water-gas itself. In chemical manufactories it could be used for heating, boiling, drying, distilling, the burning of limestone, cement, bricks and tiles, heating retorts, and for a great variety of other purposes, so that there need be no waste. *(To be continued.)*



SUGAR BOUNTIES.—The negotiations for the International Conference on the Sugar have now been almost completed, and the un of State is engaged in arranging for the meeti esentatives of the Great Powers at the Foreig

DESTRUCTION OF Dublin Inland Revenue uthorities on Wed v tons of snuff, worth about £9,000, on w been paid, to sea in a gboat, and the sn ard opposite Bailey *ghthouse.*

FROZEN MEAT.—Such is the great importation of fro meat that the London and St. Katharine Docks Compa have found it necessary to add very considerably to th already large storage accommodation at the Royal Victo and Albert Docks, and further space, capable of holding ov 20,000 carcases of mutton, has been occupied.

JAPANESE ORDERS.—The Japanese are about to supp themselves with machine-made bricks. They have order from a German firm machinery capable of turning o 16,000,000 bricks yearly.

IAL NOTICE.

dy accorded to **The Chemical Trade** very encouraging character, and proves he Journal supplies a distinct want in the trades.

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f Fine Chemicals.
l Chemists, &c., &c., &c.

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MR. WATSON SMITH ON TECHNICAL EDUCATION.

On Friday evening, the 14th inst., Mr. Watson Smith, of Owens College, Manchester, delivered an address to the students of the New Mills Mechanics' Institute. Mr. Smith, who spoke on foreign competition and the influence of wider and more thorough education in schools, said :—

The question of technical education is one which is now prominently before the country, and as one who has not only played an active part in the subject of applied chemistry, as it is called, but has seen and learnt a great deal in Germany and Switzerland of the operations in the Polytechnic schools and universities there, besides having taught in them, I may perhaps be permitted to say something on the present occasion, of what I have seen and know, as well as what I can foresee. We hear in England a great deal just now of foreign competition, because we feel a great deal of it. But we hear of, and see too, all sorts of schemes set on foot to get the better of this evil, for so it is often regarded, this foreign competition and technical education is the chief scheme before the country now. At present but little, if anything, tangible has been done or attained except amongst the sons of the working classes, and nothing so far as I can see affecting the foreign competition complained of. I said however, that something has been done and is being done. (Hear, hear.) What is it? Let me inquire. We have all heard the trite saying, that "knowledge is power," and I may add that "knowledge combined with energy are practically wealth and position." (Hear, hear.) We have also heard of the so-called "Darwinian theory," or law of the survival of the fittest. It is no Darwinian law at all, it is a Divine law. We are all fit for something, even the blind man and the cripple, even the poor lunatic may teach some lesson, or serve as a living reproach for some infraction of the laws of life and health, and if a man is not fit for one thing, it behoves him to seek out that for which he is fit. (Applause.) Some of these laws, like that called Darwin's, look hard, cold, and relentless, but that is only because of our narrow vision. We must look at them in the wisest and highest sense, and then they are seen to be all-wise. The coldness and hardness disappear. In the present case we refer, however, to one class of fitness, to one race which is to be run, that of earning and acquiring money in return for what we can give. In seeking out and finding the root of the mischief in this country, *i.e.* the difficulty of coping with, and overcoming foreign competition in our midst, let me begin by an observation that I think will not be contradicted, viz., in no countries in the world is so much haste made after money and wealth as in England and America. Now, haste is more often than not *false speed*, *i.e.*, it is seeming, but not real speed or advance. This haste after money infects all the stages and branches of education and training for the business of life; all is hastily done in the too frequent "blind rush after the main chance," as it is called. (Hear, hear.) But the work of education, if that education is to be thorough, pre-eminently demands patience, perseverance, and attention to detail, whether in the case of teacher or taught. It is not a luxurious, or semi-luxurious process, as is so often made to appear in the newspaper advertisements of many schools for youth, in which great prominence is given to seaside air, the cricket and football fields, swimming-bath, and finally,—save the mark—chemical laboratory! (Laughter.) Nay, it involves great self-denial both on the part of the pupil and teacher, it involves for both higher and deeper pleasures than those of luxury. (Hear, hear.) The difference in the bulk of English teaching in the schools from that of Germany and Switzerland may be briefly illustrated by representing the bulk of English teachers as saying to the children they teach arithmetic to, "Two and two make four, now learn that well off, and I will tell you what three and three make." Those in Germany and Switzerland would say, "Two and two make four, why? I must explain why and then I shall expect you to tell me what three and three make." This is a simple illustration of the difference between cramming and teaching. In the former process

child is not made to think independently, but to store up in memory, more or less unreasoningly: the latter process is mental exercise, the child is put into possession of a method of thought. This sounds simple, almost foolish as an example, but the illustration is a far-reaching one of the difference between too much of English and the Continental teaching. To begin with, the kind of teaching complained of, indicates want of earnestness, thoroughness and preparation; it shows haste, haste to get through an irksome task, and with as little trouble as possible. Unfortunately for the schoolboy, not only does the teacher of the private school show this haste, but the parent also, for at as early an age as practicable, absolutely without any criterion of progress and acquirement but that of being what the parent thinks "old enough to go to college" or to "business," he is removed and "pitch-forked" into college or business,—I can use no other term. It is a matter of age rather than of acquisition,—if the latter, the child would be returned to school, or rather, he would never have been in the predicament we are deploring, for the eye that could discern and appreciate that final condition would have scrutinised the progress at school. Let me not be mistaken. I am speaking here of the middle class, of the gentry of this country, and I do so in their own interest. (Hear, hear.) I should like to point out one remarkable fact I have observed, however. The higher classes of the Jews send their children with ours to school, but they get those children educated fairly well, nevertheless. How is this? I will tell you. They invariably take a personal and watchful interest in the educational progress of those children. They will not delegate the parental duty to the school teachers. If their children do not get on, or want strengthening at any point, they supply the deficiency by means of tutors or otherwise, and the consequence is, their children usually take the best positions in our colleges. This should be a lesson to us. (Hear, hear.) Let us, however, follow the course of the boy who having left school, is now taken by his father to college. The fault of over haste which runs through everything appears again now. If desirous of the son being trained as a chemist, very often because of fears that he may not shine at anything else—(laughter),—the statement is too often heard, "I am going to give him one year, or at most two years at college in the chemical department, and then he must get a place in a works." You perceive the youth suffers now from an accumulation of incumbrances that the German youth in his country and at the same stage would be free from. (Hear, hear.) With many parents the question of expense in our expensive colleges, deters from keeping their sons long enough at college. In Germany, the colleges and Polytechnic schools receive State aid, and offer exceedingly cheap education. With the higher and middle class youth coming to our colleges, three ill characteristics most frequently present themselves to the teacher—(1) Incapacity for original, logical, independent thought. (2) Incapacity for the expression in correct and clear English, of any thought whatever. (3) Especially incapacity for mathematical reasoning of the most elementary kind. It is this last incapacity that so sorely tries the teachers of chemistry in our colleges, and still more those of physics and engineering. Arithmetic, algebra, and geometry, are taught too much in that system of schooling complained of, like the teaching a child the different processes by which the glass marble can be left in the middle hole of a solitaire board,—it is merely a question of "getting the answer," or "saying the proposition," not of acquiring a habit of thought or improving the powers of reasoning. This is why, so often, the practical examples given as riders are avoided, and only the sums "done" or the propositions "said." For pluck and enterprise, the Englishman cannot in spite of all this, be beaten by anyone, and I have seen young men ere now thus heavily burdened, turn themselves about, and ' urage that is simply splendid, supple- ment by ori n at college, their maimed powers, finally re what is lost—not all, that is im- possible- ge very fairly equipped for the busi- ness of l magine a young chemist taken into a works of a laboratory. What is he there and of r ighbourhood of Widnes and on the Tyne, where are many alkali works in which y once "bottle-washers," etc., are employed,—y have picked up recipes for making solutions a commoner works products,—a term has sprun applied to these young persons, they are calle and I confess I am glad of it. But I fear not most of the young men from our coll mere testers in comparison with what their C bours are after they leave University and P Such chemists never, as a rule, introduce impr works, and not infrequently they are put to 's German who is head chemist, and who is qui keeping ahead too. (Laughter.) Do not thi to be ironical or sarcastic in what I am going I am truly grieved to see the momentary exhibiti if not despair, that sometimes follows the ing of the youth at college to the fact of what *is to be*, and *what might have been*, but very often ing never comes there. The fact is we mus middle-class schools and a different system o them if we are going to compete with Germ hear.) I believe this country is the richest in true genius, even beyond Germany, but genius a scarce commodity, and Germany has her per and is not far behind us. Recently I read paper an outcry against the competition a Germans in gaining the best places in our mer as confidental clerks, foreign correspondents, panacea to cure this ill, it was proposed th colleges should be founded, and that our yo such posts should go through a special commer "for why," ran the article, "should not youn be fitted for and hold such posts? Such a r recommended would be like clapping a fly blist of a man who suffers from melancholia or men The power of expression in language with g clearly, definitely, and grammatically, is acqui liberal, and thorough going education, not by s of set phrases, for foreign or home correspond mercial school, or any special study of the sor say, but none the less true, perhaps not stra gets to the root of the mystery, when Germa English they write it well, and moreover sho ception and general style, as a rule transcen Englishmen, and simply because, thoroughly school, they have acquired the art of a *thorou* and they learn English grammar and compo learnt their "Muttersprache" at school, as which every German acquires. Moreover, the and slang phrases in writing English. Atten detail and method, which after all means ca observation, if not conscientiousness, is chara German. Let me give you an example of this with their children. At the very earliest sta customary with the babe in a family to kee orderly fashion and according to date, of the d the different faculties as the young flower un this, besides being an interesting record for the selves, a good training in a habit, which, furt would bring about a similar watchfulness ove of the child and youth at school? We are hear in England the saying, "Oh! life is too that detail," which translated simply means, " midst of the human cataract after pleasure a what we term "competency," and have no detail. The German and Swiss is satisfied less wealth to retire upon than the Englishm the countries will show us that in neither is that after which here is regarded as little more than Surely this points to the fact that we lack t interest in our own children, in our pursuit o wealth, that German and Swiss show. At a this ceases to be so, we shall apply pressur direction to get an alteration effected in the state of middle-class schooling.

Let me now follow the average middle-class s

orks or factory. He has learnt a little chemistry, ot together a little general knowledge—a general in fact. (Laughter.) It is no good to disguise his is all it amounts to compared with that acquired verage German student in the same position, who be supposed to enter his father's works. At length apprentice becomes the young proprietor. He is ell trained in office work and on 'Change, he also acquaintance with the machinery of the works, and ulation of the processes, but practically the reins hands of the manager, under managers, and fore- egards the materials and products. In short, he *they hand over to him* for sale, and he furnishes the materials *they assure him are the best* for their in manufacturing. Now, this is just where his ore him was blind (or at least helpless), and where blind, and where he is kept blind. Others, the foremen, etc., were as eyes to the father there, was dark to him, and they will be the same to the ctically, neither father nor son as proprietors have in hand; they may console themselves by the at they at least pay the salaries and wages, and so sters. (Laughter.) So they are, and so they do, and how much? Why complain of foreign com- nd the cutting down of prices? Let me ask a r two with regard to the supply of materials to our especially those of the chemical industries, and ude paper works, printworks, and dyeworks, and so far as cotton mills and weaving sheds. The of the materials is generally on the word and ment of the managers and foremen. Now, mpetition of business, and bearing in mind proprietor trusts these managers and foremen r final judgment, to act for him who remains blind, as to the quality of materials used, nagers must receive pressure of some kind, of some kind must be brought to bear, to induce ook favourably upon materials offered by other possible, a competing firm will try to use a little asion. Temptations arise, and I admit these and foremen are placed often in most unfair and tions, in a perfect fire of temptations. An under a kind of business sets in beneath the normal ebb f outward and visible business, and sometimes other uts below that, and so on. I have heard of cases ples of materials offered direct from the factory to rks, were rejected as villainously bad, whilst sam- he same stock precisely, first passed to an experi- tle-man who knew how to swim in with the under re pronounced "exceedingly good." (Laughter, hear.) I have heard of the engineer at a works, ding his coal changed for a better sort, which was er by careful pyrometical tests, and laboratory once went to the office and declared he could not m with that new coal. (Loud laughter.) The fact any, all that this points to does not exist, if, in proprietor of the works is the director, informed and having well hold of the reins in the full sense *and this is the case*, then that proprietor gets that ng from the use of the best materials, that the oprietor in his works does not get. He puts a e in the market in addition to this, and he can do tainable by the Englishman in some cases, and difficulty in holding the reins, and being himself well as well-informed, he can be always to the new improvements, and get that benefit by leading such new improvements, commercially known as e cream off,"—the new departure and its profits. .) England, to put it plainly, is saturated with d "tipping system," which, by the way is moved either from a system of "tippling." most twin brothers, are "tipping" and "tippling."

EMITTANCES IN RUSSIA.—The postal authorities ced that money remitted through the Russian post ordinary or even a registered *letter is liable* to con- The *remittance must be noted* and value declared.

Trade Notes.

THE LIVERPOOL VINEGAR COMPANY (LIMITED).—The second annual meeting of the shareholders in this company was held on the 8th inst. at the registered offices of the company, Henry-street. The company was formed in September of last year, and commenced operations in June. Since the end of that month until September 30th the profits have amounted to 30 per cent. per annum. A dividend at the rate of 10 per cent. per annum for three months was declared, and the rest was voted to the reserve fund and for preliminary expenses.

BROXBURN OIL COMPANY.—We understand that the Broxburn Oil Company have communicated with Mr. Burt, M.P., president of the Miners' Conference at Edinburgh, expressing their willingness to meet with him and any other gentleman in order to lay before them the whole circumstances that have led to the present dispute in the oil trade, so that they may be in a position to form an impartial opinion on the matter. This course has been followed in consequence of the observations on the subject made by Mr. Burt at the meeting of the conference recently.

A special meeting of the shareholders of the Broxburn Oil Company was held in Glasgow last week. The resolutions adopted at the meeting held on 28th September, authorising the creation of 10,000 shares of £10 each, bearing preferential dividend at the rate of 6 per cent. per annum, were confirmed. Mr. R. Bell, the chairman, said he hoped the present unfortunate strike would soon terminate, as a number of the men were beginning to see the unreasonableness of the stand taken by some of their leaders against the company.

THE RUSSIAN CUSTOMS DUTY ON FOREIGN SALT.—The *Times* St. Petersburg correspondent says:—It is in contemplation to increase the customs duty on foreign salt imported into the country by way of the White Sea and the Baltic, and also across the western land frontier. The existing rate of duty is twenty copeks (gold) per poud, or 36lb. English.

HENLEY-ON-THAMES.—On the 13th inst. at Henley-on-Thames a ceremony took place, of which the chief interest to the metropolis was that it tended in the direction of freeing the Thames from some of the pollutions which for some years have made the river almost intolerable. It was the formal inauguration of a new system of sewage works for the town, which have been in progress for some three or four years past. Formerly the sewage was allowed simply to find its way into the Thames, and when this was put a stop to the corporation had to devise a means for its disposal less harmful to the community. They accordingly adopted the Shone hydro-pneumatic system, which has been successfully tried at Eastbourne, and was also adopted at the Houses of Parliament to get rid of the foul air which permeated the great buildings at Westminster. It does away with the necessity for large drains or extensive steam-pumping apparatus. The sewage is collected into ejectors, situated in different parts of the town, and is from them forced, by means of compressed air, into large tanks situated in a wood about a mile from habitations, completely hid from view, and at a height of about 180 feet. The liquid is used for irrigation purposes, and the residuum disposed of to farmers as manure. Although the system in Henley was inaugurated on the 13th inst., under the auspices of the Mayor, it has really been in operation since February, and has proved very successful. The cost has been about £18,000.

THE IMPORTATION OF ALCOHOL INTO SPAIN.—We learn from a statistical report recently published that the importation of alcohol into Spain amounted to nearly 88,000,000 litres, of which upwards of 76,000,000 came from Germany. The quantity imported last year was about the same, but as regards Malaga, Swedish alcohol is beginning to compete seriously with the German product. In the first six months of the present year 691,000 litres were imported into Malaga from Sweden, and only 564,000 from Germany. The preference given to the Swedish spirit is owing to its being more highly refined, and also to its slightly lower price.

SERIOUS ACCIDENT.—Recently an errand boy named William Webb, working at the London and Midland Counties Tea Stores, Coventry, met with a serious accident. He was cleaning the brasswork outside the shop with oxalic acid when, at the suggestion of another boy, he mixed some whitening with the acid. On being shaken the bottle exploded, the broken pieces of glass nearly cutting the boy's hand off at the wrist. He was taken immediately to the hospital, and it is probable that amputation will have to follow.

Re Matthias Joseph Landenberg Ginister, artificial manure manufacturer, Ogley Hay and Erdington.—This debtor applied in person at the Walsall Bankruptcy Court recently for his order of discharge, and Mr. Newman (from Mr. Loxton's office) opposed on behalf of creditors. The Official Receiver (Mr. E. Pritchard) reported that the debtor had failed to keep proper books of account; that he had continued to trade after knowing himself to be insolvent; that he had contracted debts without reasonable expectation of being able to pay them; that he made a composition of 15s. in the pound in 1882, under which some of his creditors were paid in full and others received nothing; and that the bankrupt's explanation as to the purchase of his business by his wife was most unsatisfactory. His Honour, after perusing the notes of the examination, said he never read a worse case. The bankrupt seemed to be utterly fradulent, and the notes showed that it was utterly impossible to get a straight answer from him. He had undoubtedly been guilty of the matters mentioned in the report, and all through his examination was utterly unreliable and untruthful. He refused the discharge.

A NEW ILLUMINANT.—A large company of gentlemen assembled a few nights ago at the works of Messrs. Fred. Braby and Co., Petershill, to witness the first public exhibition of a new illuminant, to which the patentees, Messrs. Luther and Rose, have given the name of "The Portable Sunlight." Among those present were Dr. Clarke, city analyst; Mr. A. W. Smith, Mr. Arrol, Mr. Paris, Glasgow Iron Company; Mr. Drummond, Caledonian Railway Company; Mr. M'Gregor, of Messrs. P. & W. M'Lellan; Mr. Watt, of Messrs. Watt and Wilson; Mr. Williams, Wishaw; Mr. Lawrence, and Mr. Lamberton, Coatbridge, and representatives of other important engineering and shipbuilding firms. In the new invention the light is obtained by the evaporation of creosote, tar, or other hydrocarbon oils, and the present patentees undertake to produce an intense white flame up to 3,000 candle power, according to the size of the burner, at a cost of about 1d. per hour per 1,000 candles. The apparatus required is exceedingly simple and easy of manipulation. It consists of a steel cylinder for containing the oil, tested up to a pressure of 200lb. to the square inch. This cylinder is surrounded by a cast-iron jacket to prevent condensation, and the vapour is raised by the slow combustion of a coke fire placed underneath. From the cylinder the vapour is carried through a tube of such height as may be found most convenient to a combustion box on the top. Into this box air is introduced in the proportion necessary for the perfect consumption of the gaseous vapour, with the result that when lighted a white flame of dazzling brilliancy is produced. The gas burns at a pressure of 60lb., which may be raised in about three-quarters of an hour. The cylinder, as we have stated, is tested up to 200lb. pressure, but it is provided with a safety valve, and blows off at 50lb. pressure, so that explosion is rendered impossible, the waste vapour being carried to a condenser. On the oil becoming exhausted the cylinder is replenished by means of a vacuum tube. The new lamp has been in use at Messrs. Braby's works for about six months with the most satisfactory results, and there was but one opinion among the gentlemen who witnessed the experim to the high quality and general utility of the li at merit of the lamp is that it is completely that it requires no compressor, no air-receiv e is perfect combustion of the vapour. In ad apparatus can be wheeled or carried to any which it may be in use at a moment's no hing or in any way interfering with th

GALVANISED IRON TRADE ASSOCIATION influential meeting of the members of this held at the secretary's office, the Birmingham week. In the absence of the president, the pied by Mr. R. G. Walker (Messrs. Walker president. An animated discussion took pl of the markets. In consideration of advance black sheets and spelter, the members deci further advance of 10s. per ton in the pric iron sheets, making £1. advance since Ju opinion was freely expressed that the outlo indicate a still further hardening of prices at as there was every probability of further up in raw material.

A VALUABLE DISCOVERY.—The *Rhyl Ad* Mr. G. S. Hazlehurst, of this town, has succe another important chemical discovery, and o to attract much attention. It is nothing less by which sea water may be instantly tran refreshing, effervescing, saline draught. Th been patented by Mr. Hazlehurst under the titl It is needless to remark that such a discov invaluable to persons shipwrecked at sea an days in an open boat, without a supply "Thalassion" will undoubtedly take its pl most useful and important discoveries of mod

A NEW WATERPROOFING PROCESS TO Our correspondent in Berlin informs us th process is being employed with considerable s the large waterproofing establishments in Ge len and half woollen cloths are treated with a parts of alum, 100 parts of glue, five parts of parts of soluble glass. The alum is dissolved quantity of boiling water, the glue is steepe until it has absorbed twice its weight of w melted by heat. The tannin and soluble glass into the solution of glue, to which the alum added, and the whole is well stirred and The gelatinous mass is employed as follows the mass is boiled for three hours in ten to fiftee fresh water being continually added to compe ration. The bath is then allowed to coo Centrigade, and the material to be rendere kept in it for half an hour, then withdrawn, a is allowed to drip from it for several hou cloth is stretched on a frame and allowed to d ture of 50 degrees. The cloth gains consider and is perfectly waterproof, though it impe nor perspiration. Of course the cloth is eventu The dyes of coloured cloths are rendered mor this process; but when light colours are in requisite to use as colourless glue as possible, is entirely free from iron.

THE ALKALI TRAD

ON Thursday, the 20th inst., as may be se to-day, the bleaching powder makers met, and carry out the convention for another year. caused a little stiffening of prices, though so we cannot see, as there will be ample to wants of the world during 1888. Some larg been made for all 1888 at £7 per ton on rail St. Helens. Soda-ash and caustic remain changed, but are very weak through over- there is very little prospost of any advance in

THE MISCELLANEOUS CHEMICAI

THERE are no movements of importan chemicals generally. The market upon th and buyers will, as a rule, find prices in their

CRYSTAL ALUM and SULPHATE OF AL to move off slowly without change in and £5. 10s. respectively, at works.

MURIATE OF AMMONIA is in better req £22. 10s.

C ACID is in fair demand with consumers at 10s. to 6d. per cwt. for 25 °/₀.

ATES OF LIME, brown and grey, are firmer, £9. 15s. £13. 10s. respectively at usual points of delivery.

E OF LEAD is well maintained at £27. 5s. and £28. foreign and English brands; brown at £19s. 10s.

is a steady demand for BICHROMATES OF SODA and ASH at 3½d. and 4½d. per lb. respectively.

MIC ACID, a new product, is finding its way into the ket at 4d. to 4¼d. per lb., according to quantity.

is a fair amount of inquiry in various chemicals rers, who at this period of the year usually make for forward supplies. A glance at prevent values ded in our list of prices current, and a comparison se of former periods, should to some extent assure g buyers that they have little to fear if they can make ntracts at present rates.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

market for paraffin chemicals is in a more or less ised state, due primarily to the insensate action of the finers' Union. Product prices are high comparatively, ng no benefit, however, but rather the reverse. The ly outcome of the present unnatural and necessarily ral condition of things being an increase of the n and Russian grip on the Scotch and English con- n to the lasting detriment of the home producers. scale and wax fetch better prices than for many a already an increased volume of American consign- hurrying in, prepared for disposal at fractionally rices should manufacturers' proposed international mpact still hang fire, and even then good for a fair of profit to the foreign consigners. Paraffin oils (both and lubricating) experience a like temporary inflation, the same penalty of early collapse directly their competitors, attracted by the heightened prices, arrive ient quantity. This section of the Scotch chemicals is decidedly feverish and unhealthy. For the rest, e exception of bleaching powder, which maintains last week's spot firmness, though easier, perhaps for , flatness is the prevailing characteristic, a further l drop having taken place in caustic and in most of vier chemicals. The turnover of the week has been General prices currant are:—Soda crystals, 46s., e; alum, £4. 17s. 6d., less 2½ °/₀ Glasgow; borax, refined, £31, and boracic acid £46, net Glasgow; , 48/52° 1d., less 5 °/₀ Tyne; caustic soda, white, 5s., 70/72°, £7. 7s. 6d.; cream, 60/62°, £6. 2s. 6d., °/₀ Liverpool; bicarbonate of soda, 5 cwt. casks, d 1 cwt. casks, £6. 5s., net Tyne; refined alkali, 1½d., less 5 °/₀ Tyne; salt-cake, 21s. to 22s. f.o.r. ; bleaching powder, £8. f.o.r. Glasgow; bichromate h, 4½d., and of soda, 3½., less 5 and 6 °/₀ to Scotch glish respectively; nitrate of soda, 8s. 9d. to 9s. 1½d.; of potash, 6d., less 5 °/₀; sulphate of ammonia, £11. 2s. 6d., f.o.b. Leith; paraffin scale, hard, 2½d. to 2⅝d.; paraffin wax, 3d.; paraffin spirit, 7½d.; oils—burning, 6d. to 6¼d., for most favoured brands, ricating, 865°, 90s. to 100s., 885°, £5 10s.; sulphate er, £13 10s., less 5 °/₀ Liverpool. Week's imports 31,356 bags sugar, 700 barrels oil, 1,550 tons pyrites, bags asbestos.

THE TAR PRODUCTS MARKET.

ZOLES remain *in statu quo*. Nineties are, however, rth more than 2s. 9d. and 50/90 more than 2s. 1d. te and anthracene are firmer, especially for B quality ene, which is now worth 11d. The uncertain er of the future of the benzol market is clearly shown recent decline in the value of crude naphtha. For l delivery the benzol distillers are expecting to get "crude" at their own price, but we have heard of instances in which *tar distillers, who hitherto* have only produced crude naphtha are preparing to distill their own production rather than sell at a low price. Carbolic acid is still in good request, and the price is about 4s. London, or 3s. 10½d. Manchester for good crude 60's. Pitch is still sick. The immense stock at Runcorn still exists, and we are informed there cannot be less than 10,000 tons there, principally belonging to Manchester makers.

THE SULPHATE OF AMMONIA MARKET.

THE market closes quiet all round, but very little business is doing, as may be seen from the Hull exports of last week. Whatever orders are going out now are being filled by speculators, who have long ago accepted the orders at £11. 5s. The Hull market is very quiet, and the value there has fallen to £11. 3s. 9d., though we have heard of several sales at £11. 5s. 0d.; but buyers will not give this price any longer, as the tendency is to a further fall. Beckton is nominally still £11. 15s., but as they have none to offer this factor has no effect on the market. Outside London makes stand at £11. 7s. 6d.; and £11. 0s. 0d. is the value of f.o.b. Leith.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

14000. F. BALE. For improvements in the manufacture of ammonia and hydrochloric acid, and in the apparatus employed therein. October 15.

14001. F. BALE. For improvements in the manufacture of ammonia and chlorine, and in the apparatus employed therein. October 15.

14046. G. E. DAVIS. For an apparatus for extracting arsenic from oil of vitriol and muriatic acid, and for the absorption of gases by liquids, and by substances held in suspension in liquids. October 17.

14085. H. J. FENNER and G. H. FENNER. For improvements in the manufacture of naphthaline into forms suitable for use in illumination, and in apparatus employed therein. October 17.

14127. L. MOND and G. ESCHELLMAN. For improvements in the manufacture of chlorine. October 18.

14174. J. S. MACARTHUR, R. W. FORREST, and W. FORREST. For improvements in obtaining gold and silver from ores and other compounds. October 19.

14212. A. S. ELMORE. For improvements in the electrolysis of aqueous solutions. October 19.

14280. S. M. BURROUGHS and Messrs. BURROUGHS, WELLCOME AND CO. For improvements in apparatus for compressing drugs and other substances. October 20.

14285. J. THOMSON. For an improved mercurial antiseptic soap. October 20.

COMPLETE SPECIFICATIONS ACCEPTED.

16461. F. D. BROWN. A communication from A. Howatson, of Belgium. For an improved method of treating sewage and apparatus for the purpose. December 5, 1886.

16595. W. H. NOBLE. For improvements in the manufacture of gunpowder and of gunpowder charges for guns. December 17, 1886.

62. W. DONALD. For improved treatment of hydrochloric acid gas for the production of chlorine gas. January 3, 1887.

875. G. THOMAS. A communication from A. Zander, of Prussia. For the manufacture of dye matters from red sanderswood and certain other woods. January 20, 1887.

OUR PRICE CURRENT.

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ACIDS:—				
,, Acetic, 25 °/₀	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6⅞
,, Arsenic	per cwt.	0	12	9
,, Chromic 70 °/₀	per lb.	0	0	4¼
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.	per bottle	0	0	6
,, ,, (cylinder) 30° Tw.	,,	0	2	9
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4
,, Sulphuric (fuming 40 °/₀)	per ton	12	0	0
,, ,, (Brimstone 168°)	,,	4	5	0
,, ,, (Pyrites 168°)	,,	3	7	6
,, ,, (spent oxide 168°)	,,	3	17	6
,, ,, (,, 150°)	,,	2	5	0
,, ,, (Pyrites 150°)	,,	1	15	0
,, Tartaric	per lb.	0	1	6¾
Arsenic, white powdered	per ton	10	12	6
Alum	,,	4	15	0
Ammonia, ·880 = 28°	per lb.	0	0	3⅜
,, = 24°	,,	0	0	1⅞
,, Carbonate	,,	0	0	3½
,, Muriate	per ton	22	0	0
,, ,, (sal-ammoniac)	per cwt.	34/- & 32/-		
,, Sulphate (grey), London	per ton	11	7	6
,, ,, (grey), Hull	,,	11	3	9
Aniline Oil	per lb.	0	0	9¾
,, Salt	,,	0	0	8¼
Antimony	per ton	35	0	0
,, (tartar emetic)	per lb.	0	1	0
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	4	0	0
,, Sulphate (native levigated)	,,	3	5	0
Bleaching Powder, 35 °/₀	,,	7	12	6
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	12	5	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 °/₀ f.o.b. London,	per unit per cwt	0	1	3
Benzol, 90 °/₀	per gallon	0	2	9
,, 50 °/₀ ,,	,,	0	2	1
Carbolic Acid (crystallised 35°)	per lb.	0	1	2
,, (crude 60°)	per gallon	0	3	10½
Creosote (ordinary)	,,	0	0	1
,, (filtered for Lucigen light)	,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	0	10
Grease Oils, 22° Tw.	per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston	,,	0	11	6
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	40	10	0
,, Sulphate	,,	13	10	0
,, Oxide (copper scales)	,,	36	15	0
Glue	per cwt.	1	15	0
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	55	0	0
on (turnings)	,,	1	13	0
, Peroxide (blue billv)	,,	0	7	0
, ,, (b	,,	1	13	0
,,	,,	3	0	0
Sulphate	,,	1	2	6
Sulphi[illegible]	,,	1	0	0
l (sheet	,,	13	17	6
Acetr	,,	27	5	0
,,	,,	19	10	0
Nit	,,	22	10	0
Lime, Acetate (brown)	per ton	9	15	0
,, ,, (grey)	,,	13	10	0
Magnesium (ribbon and wire)	per oz.	0	2	6
,, Chloride	per ton	2	7	6
,, Carbonate	per cwt.	1	17	6
,, Hydrate	,,	0	10	0
,, Sulphate (Epsom Salts)	per ton	2	10	0
Manganese Sulphate	,,	19	10	0
,, Borate	per cwt.	2	5	0
,, Ore, 70 °/₀	per ton	2	10	0
Methylated Spirit, 60° O.P.	per gallon	0	2	4
Naphtha (Wood), Solvent	,,	0	4	1
,, ,, Miscible, 60° O.P.	,,	0	5	4
OILS:—Castor	per cwt.	1	4	9
Cotton-seed	per ton	20	10	0
Linseed	,,	19	10	0
Lubricating, Scotch, 885°—890°	,,	7	0	0
Petroleum, Russian	per gallon	0	0	5
,, American	,,	0	0	5½
Silver (metal)	per oz.	0	3	8
,, Nitrate	,,	0	2	[illegible]
STARCHES:—				
Sago	per cwt.	0	8	
Potato (farina)	,,	0	10	
Sodium (metal)	per lb.	0	6	
,, Carb. (refined Soda-ash) 48 °/₀	per ton	5	0	
,, ,, (Caustic Soda-ash) 48 °/₀	,,	3	18	
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	2	
,, ,, (Soda Crystals)	,,	2	10	
,, ,, (Crystal Carbonate)	,,	5	6	
,, Chlorate	per lb.	0	0	
,, Borate (Borax)	per cwt.	1	8	
,, Bichromate	per lb.	0	0	
,, Hydrate (74 °/₀ Caustic Soda)	per ton	8	2	
,, ,, (70 °/₀ Caustic Soda)	,,	7	7	
,, ,, (60 °/₀ Caustic Soda, white)	,,	6	7	
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	2	
,, Bicarbonate	,,	5	17	
,, Hyposulphite	,,	5	5	
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	8	
,, Silicate (glass)	per ton	5	10	
,, ,, (liquid, 100° Tw.)	,,	4	7	
,, Sulphate (Salt-cake)	,,	1	2	
,, ,, (Glauber's Salts)	,,	2	2	
,, Sulphite	,,	5	15	
Potassium (metal)	per oz.	0	3	
,, Bichromate	per lb.	0	0	
,, Carbonate, 90%	per cwt.	0	18	
,, Chlorate	per lb.	0	0	
,, Hydrate (Caustic Potash)	per ton	22	0	
,, Nitrate (refined)	per cwt.	1	2	
,, Prussiate Yellow	per lb.	0	0	
,, Sulphate, 90 °/₀	per ton	9	15	
,, Muriate, 80 °/₀	,,	8	10	
Strontium Hydrate, 98 °/₀	,,	7	0	
Sugar, Beet	per cwt.	0	12	
,, Cane	,,	0	16	
Sulphocyanide of Barium	per lb.	0	0	
,, Ammonium	,,	0	0	
Sulphur (Flowers)	per ton	9	5	
,, (Roll Brimstone)	,,	5	15	
Superphosphate of Lime (28 °/₀)	,,	2	0	
Tallow	,,	22	10	
Tin (metal)	,,	120	0	
,, Crystals	per lb.	0	0	
Zinc (Spelter)	per ton	16	0	
,, Chloride (solution 96° Tw.)	,,	5	15	

The Chemical Trade Journal,

SATURDAY, NOVEMBER 5, 1887.

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TO ADVERTISERS.

SPECIAL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

In the first week of the approaching New Year we shall issue a **SPECIAL NUMBER** of the **Journal.** We propose to bring our first volume to a close with the last Saturday in December, 1887. The issue of January 7th, 1888 (No. 33), will commence Volume II. It will be an enlarged special number of very general interest. We shall issue along with it a **Title-page** and **Index** for the first volume, together with a neat and useful **Office Almanac,** suitable for our subscribers, which is now in course of preparation.

Including our regular subscribers, our New Year's Number will be issued to **NOT LESS THAN 10,000 FIRMS AND INDIVIDUALS,** so that intending advertisers will see at once, that this issue is worthy of their special attention.

We may explain that in our Publishing Department, we possess very carefully compiled lists—in most cases the result of special knowledge and information at our command—of every firm of repute, both at home and in the main trading centres abroad, connected with the various industries whose interests it is our province to serve. We utilise these lists week by week, by selecting a number of them in turn, and sending out free copies of the Journal to those firms who have not yet become annual subscribers. The result is that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of the New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO,** numbering altogether, as we have stated, not less than **10,000** names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

WHAT IS THE FUTURE OF BLEACHING POWDER?

It is true that MM. Pechiney et Cie., of Salindres, Gard, France, have succeeded in making bleaching powder upon a manufacturing scale from magnesium chloride; but from all we can learn the bleach made by the process costs nearly double that made by the old Weldon process. This being the first apparatus erected, no doubt great economies may be introduced; in fact, it is stated that MM. Pechiney hope to soon reduce the cost of production so as to bring the new process within the range of "practical politics," but we fail to see where the advantage is, if it is not cheaper, or at least as cheap as the old process. Their advantage may be in being able to utilise the chloride of magnesium, of which MM. Pechiney have enough and to spare, and by working the new process in conjunction with the old, they may make double the quantity of bleaching powder per ton of salt decomposed.

But again, where is the advantage if the bleaching powder costs more per ton? It may be in having less saltcake to sell at a loss, and this to the English makers would be a decided gain, provided that the bleaching powder costs no more to make than at present, when it has to to bear the loss upon the soda. But if less soda was made by the Leblanc process there would be more room for ammonia-soda, and this might suit MM. Pechiney, who are also makers of ammonia-soda, but it might not suit Widnes or St. Helens.

However this may be, the chief success of the process depends upon the cost of production and not upon the scientific success of the processes of manufacture; but if the processes of manufacture be a success it may be worked at Stassfurt, and elsewhere on the Continent, where chloride of magnesium is plentiful and cheap. The English manufacturers naturally and rightly wish to acquaint themselves with the details of the new process, and for this purpose several of them have already arranged to visit M. Pechiney's works: they scent danger in the wind; but with cheap salt and cheap pyrites they need not be afraid, and if they can reduce the cost of sulphur to one penny per unit per ton, as is stated, they may if they have any enterprise left, still defy creation so far as the manufacture of bleaching powder is concerned. We have written MM. Pechiney inquiring how the matter stands at present, so that we hope to be able to give our readers some further information in our next number.

COLONEL MAJENDIE'S REPORT ON THE EXPLOSION AT CORNBROOK.

THE report by Colonel Majendie, C.B., Chief Inspector of Explosives to the Home Office, with reference to the circumstances attending the fire and explosion at the chemical works of Messrs. Roberts, Dale, and Company, Cornbrook, near Manchester, on the 22nd of June last, has just been published. Colonel Majendie states that the Cornbrook factory has been occupied by the present firm since 1852, and the accident occurred in the portion of the works on the north side of Cornbrook-road. The first intimation of anything unusual was the outbreak of a fire about seven or eight minutes before noon, which originated either at or in the vicinity of the stove in which picric acid was dried. After a lapse of five or six minutes there was an explosion of a moderate character, followed by a second one of a tremendous and destructive character. In dealing with the circumstances attending the fire, Colonel Majendie expressed the opinion that it was caused by a workman named Heyes smoking. An exhaustive account of the facts connected with the explosion is then given, and in reference to the suggestion that Messrs. Roberts, Dale, and Co. had engaged in the surreptitious manufacture or storage of explosives, Colonel Majendie says his decided opinion is that the suggestion is wholly without foundation. He also dismisses the theory that the explosions were the result of outrage on the part of some evil-disposed persons, and turns to the question whether the explosion did not result from substances present on the works in the ordinary process of manufacture. As the result of an exhaustive scientific investigation, the particulars of which are given in the report, Colonel Majendie says :—Impartial opinion can hardly be divided as to the fact that whether originally present or not, a considerable quantity of picric acid existed on the site of the large crater in the works, and that this acid having come into contact with litharge was thus primed with a self-formed detonator, consisting either of a picrate or of a mixture of some of the picric acid with one of the oxidising agents present, and that on the fire reaching this detonator it exploded with the effects referred to. His conclusions are therefore that the accident originated in the fire, and that such fire was caused by Heyes, either in lighting or smoking or "knocking out" his pipe: that the first or minor explosion probably occurred inside the stove as the direct result of the fire, and that the second or main explosion was due to the detonation at the site marked by the larger crater of a quantity of picric acid and self-formed picrate of lead, and that this detonation effected the simultaneous detonation of the picric acid in the crystallising vessel at the site marked by the smaller crater, the whole being the result of the fire originated by Heyes. As to the question of blame, Colonel Majendie says—"If my view of the origin of the fire be correct, it follows that a criminal responsibility rests upon the man Heyes, to whose deliberate and dangerous disregard of orders the whole disaster was due; but I am unable to acquit Messrs. Roberts, Dale, and Co. of contributory negligence whether or not these gentlemen were ignorant of the probable consequences of the fire attacking a quantity of picric acid which contained a small quantity of litharge or some oxidising agent, and they are entitled to whatever benefit they may claim from the fact that this point had not, previously to my experiments, been practically explained. It is impossible to doubt that a chemist of the experience of Mr. Dale must have been cognisant of the properties of a picrate pure or of a mixture of picric acid with an oxidising agent, and must have had some conception of the danger arising from the presence of such a substance. Having regard to what I believe to be the general trade knowledge on the subject; having regard to the statements in chemical and other authoritative works to which Mr. Dale could, of course, have had access; having regard to the facility with which the question of risk could have been experimentally investigated, and to the [illegible]erious consequences which a neglect to apply the prop[illegible]autions against dangerous admixtures might give ri[illegible] should be failing in my duty if I did not exp[illegible]*cided opinion* that the carrying on of the manufacture of picric acid in close proximity to or almost in contact with such subjects as litharge and nitrate of lead, and certainly without any adequate precautions for the strict separation of the substances, and the admitted occasional use of the same stove for the drying of the picric acid and the nitrate of lead, whether at the same time or not, must be regarded as examples of great carelessness or ignorance, which under the circumstances would be scarcely less censurable." As regards the precautions to be adopted in future in factories where picric acid is made or used, Colonel Majendie says that "these precautions should proceed towards a rigid separation of picric acid from every other substance or ingredient contact with which would be likely under favourable conditions to produce a picrate or explosive mixture; but it may prove necessary on a fuller examination of the question to insist upon a larger measure of precaution than this. At present picric acid and picrates appear to fall within the category of 'explosives,' and to be subject to the Explosives Act, 1875, only when they are 'used or manufactured with a view to produce a practical effect by explosion or pyrotechnic effect.' In view of the present disaster, however, and of the results of my experiments (to be supplemented possibly by others) it will be a matter for careful consideration whether it is not necessary in the interests of public safety to take advantage of the powers conferred by the 104th section of the Explosives Act, 1875, and to extend the definition of 'explosives' to picric acid and all picrates for whatever purposes manufactured, and to apply the same provisions of the Act subject to such exceptions, limitations, and restrictions as may appear reasonable. This point, however, is one which in the interests of the trade as of the public demands the fullest and most careful consideration, and it is not necessary that I should discuss in the present report."

WATER-GAS.

V.

AGAIN, where superheated steam can be used, an apparatus like the first Essen one is a cheap source for the same, as after the gas making operation there is a considerable surplus of heat in the regenerator. The superheated steam, as mentioned before, requires only about 160 calories per cubic metre of water-gas, while in the 4 cubic metres of generator gas produced during the warm blast there are 4,000 calories at disposal. As in large establishments more than one generator will always be used, the production of generator gas becomes a continuous operation, so that it would not be necessary to employ a gasholder, thus naturally simplifying its utilisation.

A plant has now been in use for some years at the works of Messrs. Schultz, Knaudt, and Co., in Essen, producing 500 cubic metres of water-gas per hour. The apparatus consists of two generators and two scrubbers; one for generator gas and the other for water-gas, while two further similar plants have by this time passed from the contemplative stage. In both instances, the generator gases are used for the purposes of smelting and puddling, whether it be separately or in union with water-gas; also for the generation of steam, and for use in gas engines.

If the generator gas produced be mixed with the water-gas also produced, and we assume that per cubic metre of water-gas one kilo. of carbon is used, we then obtain a gas of the composition :—

CO	0·5	cubic metre.
H	0·5	"
CO	1·36	"
N	2·65	"

or :—

CO	1·86	cubic metre.
H	0·50	"
N	2·65	"
	5·00	"

which in percentages is :—

CO	37
H	10
N	53
	100

e 5 cubic metres give on burning about 7,000 calories, at in 1 kilo. of carbon containing in round figures 8,000 ies, only ⅜th has been lost in transforming the solid on into gaseous fuel. One cubic metre generator gas shes on burning, in round numbers, 1,000 calories, and lopes a temperature of 1,890° C., while 1 cubic metre of mixed gas yields 1,400 calories and a temperature of 0° C. This mixed gas has the same composition as the alled Wilson or Dowson gas, which is produced by blow- a mixture of air and steam into a special generator. son gives the following analysis of such a gas :—

CO	26·89
CO_2	4·00
H	11·55
CH_4	1·40
N	56·11
	99·95

analysis of water-gas made in Fürstenwalde gave the owing results :—

CO	42·3
H	49·2
N	4·3
CO_2	3·2
	99·0

the generator gas :—

CO	28·0
CO_2	2·0
H	2·0
N	68·0
	100·0

two when mixed in the proportion of one volume of er-gas to four volumes of generator gas possessed the owing composition :—

CO	30·8
CO_2	2·2
H	11·2
N	55·2
	99·4

, as will be seen, is still better than Wilson gas, and h better than Siemens' gas, which according to Stöck- n possesses an average composition as follows :—

CO	21·0
CO_2	6·0
CH_4	2·0
H	7·5
H_2O	4·5
N	59·0
	100·0

periments made some years since at Essen with a two e-power gas motor conclusively proved that a consump- of two cubic metres of water-gas, or five cubic metres of d gas per hour yielded respectively one horse-power, so in working with mixed gas only one cubic metre of r-gas and four cubic metres of generator gas were used. e employment of the Wilson or Dowson gas for motive r, it is difficult to produce a gas of quite uniform com- ion, as the resistance of the fuel layer varies according to eight and quality of the fuel, in such a manner that the n acting as an injector conveys into the generator very ng quantities of air. *In the water-gas* apparatus the composition of the mixed gases can only change immaterially, as both the generator gas and the water-gas possess a composition which, for all practical purposes, may be considered constant.

Unlike the gas produced in the so-called Siemens' generator, the generator gas in the water-gas apparatus can be placed under pressure, and can consequently be driven to any distance, so that it is quite possible for the gas to act as an injector, and carry in with it into the furnace the air necessary for its combustion. The mode of working the apparatus in view of what has been already stated is entirely clear, we need only say a few words more with respect to the charging apparatus. These are constructed in the well-known manner with a "pear and cover," and the arrangement is such that when the cone is closed the cover is lifted, and the reverse. As after each charging the funnel is filled with generator gas, which escapes on lifting the lid, the handwheel for manipulating the valves is placed at some distance from the charging funnel. The cone, as well as the Morton doors on the first Essen apparatus, are now after four years of uninterrupted work completely tight, and the same may be said of the chimney valves. The box immediately above the water-ring is somewhat burnt, but otherwise it is quite intact. On the other hand, the first regenerator has had to be renewed, and now instead of the network of bricks, the chamber is furnished with walls according to Whitwell's plan, in order to attain a greater degree of resisting power or longevity.

(To be continued.)

GAS-TAR AND ITS USES.

VI.

THE employment of liquid fuel by injecting it into the furnace of both Cornish and Galloway boilers has been very well described in a paper read before the Institution of Civil Engineers by Mr. Harrison Aydon, on February 26th, 1878. He then stated that "the vapour, steam, and air in the requisite quantities are injected into the furnace (generally over the door), and there consumed. The combustion is perfect, the flame being lurid, transparent, and tinted with the brilliant colours of burning carbonic oxide and hydrogen; smoke is prevented, and the chimney need only be large enough to take off the waste products of combustion and carry them above the head of the attendant. As no draught is required, these products or waste gases may be allowed to escape at a temperature little above that of the steam in the boiler. No alteration of the ordinary furnace or grate is needed, so that either coal or oil can be used indifferently. For burning oil the grate bars are covered with thin fire-slabs and a few cinders, the ashpit doors are closed to keep out surplus air."

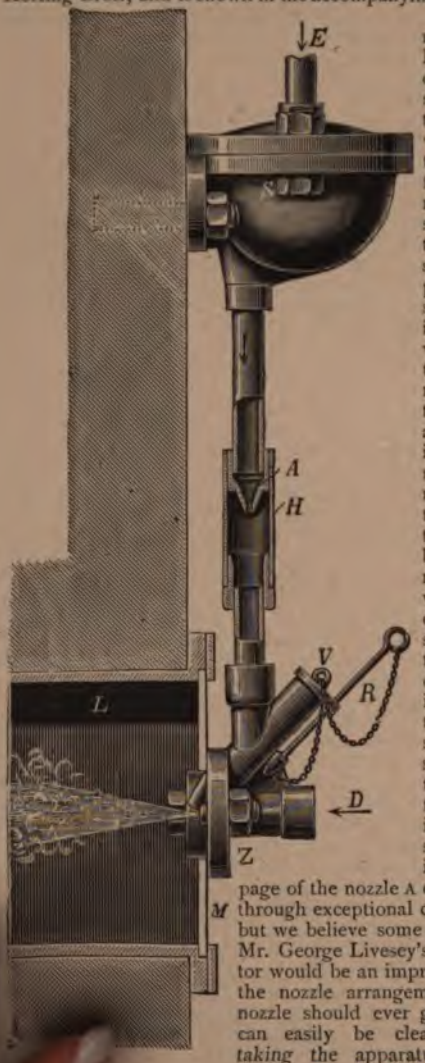
With such an account before us, and its truthfulness can be attested by us from actual experience, is it not surprising that gasworks administrators should be found, either selling tar below fuel price, or bemoaning the fact that distillers will hardly take the tar away "as a gift." In the paper already cited, many details are given of results obtained in steam raising with liquid fuel at the chemical works of Messrs. W. C. Barnes and Co., of Hackney Wick. Here, the steam injecting system was employed and gave very satisfactory results; but, we fear the evaporative power is placed too high when it is stated that 1lb. of oil will evaporate 25·8lb. of water.

There is every reason to believe that the action of the steam-jet is twofold—the atomised mixture of steam and oil being first decomposed into carbonic oxide and hydrogen, which immediately burn with their characteristic short and intense flame. There seems to be practically no limit to the heat which can thus be generated, but it is the intensity of this heat that militates against its employment for heating retorts. The steam-jet burner has been tried in many works, and has over and over again been condemned on account of its having been placed in unsuitable situations. In all well constructed steam-jet apparatus this local intensity of the flame must exist, and can only be modified at the expense of

efficiency, so that it is useless to expect it to do its work properly and economically so far as repairs are concerned, in heating gas retorts, unless the retorts are so disposed in the oven as to be practically out of reach of the intense zone of combustion which obtains in the employment of this system. All those gas engineers who have burnt tar for heating purposes by the aid of a jet of steam, and who have furnished us with information regarding their experiments, agree that the steam-jet system cannot be used in settings of seven, but in settings of six it may be employed with advantage, if used judiciously; but with the slightest carelessness destruction of the furnace soon occurs.

As before stated, the best results are only to be obtained by the use of carefully constructed apparatus. It is a great mistake to fancy that any rough home-made injector will do its work properly as a tar burner. The supplies of steam and tar must be proportionate, and the areas of the nozzles carefully calculated out; an excess of steam cools down the furnace, and an excess of air does likewise, so that the regulation of the supply of these two agents must be under perfect control. Of course, it is to be understood, that in any form of tar burner the filtration of the tar before reaching what we call the tar burning apparatus proper, is a *sine qua non*.

A very good form of burner is that made by Messrs. Körting Bros., and is shown in the accompanying illustration.



The apparatus is strongly constructed of iron: it consists of a pipe through which well screened tar coming from above runs in a thin stream. The tar meeting a steam-jet placed at a suitable angle is divided into very fine particles, and mixed with the air that is also projected into the furnace. The regulation of the supply of tar is effected by the tar nozzle A, which is made of varying sizes to suit the physical differences in its quality. As the tar is again strained or screened through the filter S, which is easily accessible for cleaning, a stoppage of the nozzle A can only occur through exceptional circumstances; but we believe some adaptation of Mr. George Livesey's tube regulator would be an improvnment over the nozzle arrangement. If the nozzle should ever get stopped it can easily be cleaned without *taking* the apparatus down, by slipping up the sliding tube H and cleaning the nozzle with the needle R. If necessary, the whole pipe can be unscrewed and taken out without disturbing either the nozzles or the screen. The spray apparatus itself can be cleaned whilst working without danger, by taking out the plug V and pushing the needle R through the nozzle. The lower portion of the apparatus is fixed to a short air-pipe, which is inserted into an opening in the brickwork of the furnace, and through this pipe L, the steam-jet draws in with considerable velocity the air necessary for the combustion of the tar. We may here add that attention must be paid to the correct regulation of the air supply; with too little, it is quite possible to melt down the air slides of the pipe L, while too much air contributes to the inefficiency of the apparatus. The combustion is easily regulated by means of the steam-valve, and the air slides should be so adjusted as to give just sufficient air to make the combustion smokeless. The danger in the use of this apparatus is the melting down of the furnace; but if this is well considered by those who intend to use it, surely such an occurrence can be guarded against.

(To be continued.)

THE ANALYSIS OF TRADE PRODUCTS.

III. TESTING ALKALIES.

Soda-ash.—Soda-ash is largely employed in many of the industries of this country, and may be met with of very varying strengths. In fact, owing to the rule of thumb way in in which many of the textile industries have been carried on, it is not uncommon to find isolated works where "ash," that is soda-ash, is used of a certain strength, and which could not be departed from without disarranging or throwing out of joint some of the processes in which it is used. Thus, for instance, in the woollen districts, soda crystals containing about 19 per cent. of alkali are extensively employed on account of their being free from caustic soda, which would injure the wool fibre, and so it has come to be considered that a weak soda-ash of about 30 per cent. is necessary for this business. This is quite erroneous; and for purposes of wool-scouring no more suitable soda-ash could be obtained than that produced by the ammonia-soda process, which is absolutely free from caustic soda. Ammonia-soda contains, however, about 58 per cent. of alkali, so that speaking roughly, 6 cwt. of it will do the same work as a ton of soda crystals, or 10 cwt. as much as a ton of 30 per cent. ash.

These rule-of-thumb conditions may be found in almost every district. The bleaching districts of Lancashire require 48 per cent. soda-ash, and for the purposes of bleaching it is necessary that about one-fifth of this should be present as caustic. Other manufacturers use a 50 per cent. "ash," and though a small amount of caustic can be tolerated, an excess over 1 or 2 per cent. is considered injurious. It will thus be seen that the estimation of the "total alkali" and the "caustic alkali" in commercial soda-ash is an operation of the utmost importance to bleachers, paper makers, dyers, and calico printers, and an examination should be made of every cask brought into the place.

The examination for "total alkali" is made in this way:—A large sample of about 3 or 4lb. is to be taken from the cask in various places, the centre not being neglected. This large sample may be conveniently ground up in a small hand coffee-mill, and the whole well mixed. Two small 2 oz. bottles should be filled with it, and labelled with the number of the cask and the date, leaving room to insert the result of the analysis when finished. One should then be sealed and put aside, the other being used to test from.

Weigh off accurately 3·1 grammes of the finely ground soda-ash in a counterpoised watch-glass, transfer it to a piece of *dry*, well-glazed writing paper, aiding with a *dry* camel's hair pencil, if necessary. Slide the weighed quantity into a 400 c.c. flask, and add 100 c.c. of distilled water; warm over a Bunsen burner or "rose" burner until dissolved, add a few drops of litmus solution to colour it faintly blue, and finally add little by little by means of the burette fig. 2,697 the normal sulphuric acid (which has been already prepared, see

precisely in the same manner as described in the n of that acid. When, after well boiling the oint is reached, that is to say, the point when the of another drop of acid would turn the purple-red a full red, the addition of acid is stopped, and the of c.c. used from the burette will indicate the e of "total alkali."

mount of "caustic alkali" present may be readily d by the following method, which has been used riter since 1871:—Put 3·1 grammes of the finely sh into a small porcelain mortar (fig. 57, No. 6), c. methylated spirit, and grind the two together; settle, and pour the clear liquid into a filter and aced in a 200 c.c. flask. Repeat this trituration hylated spirit several times, pouring the clear spirit lter, finally washing the ash on to the filter with d spirit from a wash-bottle (fig. 1,725). The clear liquid is then to be diluted with 150 c.c. of distilled d titrated with the normal sulphuric acid exactly as on page 194 when treating of the preparation of ustic soda solution, the number of c.c. used from e indicating the percentage of caustic alkali existing oda-ash. The foregoing method is sufficiently for all practical purposes. It is easy and rapid, but fic accuracy be required, account must be taken of te quantity of carbonate of soda dissolved out by ylated spirit.

qualities of soda-ash require a modification of the methods. Weak, or 30 per cent. soda-ash, is often n the refuse or waste salts of some previous operation, times contains large quantities of sulphite of soda, the sulphurous acid of which becomes liberated e titration, its base being erroneously calculated as If, during any titration of soda-ash with acid, a sulphurous acid be perceived, the assay should be ed and recommenced in the following manner:— f 3·1 grammes of the ash and dissolve in 150 c.c. of a flask of the usual size; now add 10 c.c. of of hydrogen solution of the strength commonly s "ten volumes," colour with litmus, and titrate al way with normal sulphuric acid, the number of indicating the percentage of real "total alkali."

ic Soda is tested as follows:—Weigh off 31 dissolve in about 150 c.c. of distilled water in a ool and make up to one litre. Take out 100 c.c. lution and place in a beaker, add a few drops of d run in the normal sulphuric acid from the burette blue colour of the litmus has given way to the int already described. The number of c.c. of cid consumed from the burette indicates here also nt of "total alkali" present.

(To be continued.)

INDIARUBBER MANUFACTURER AND HIS MACHINERY.

Manchester Assizes on Monday last, Mr. J. Stanley an indiarubber manufacturer carrying on business hester, sued the defendant, Mr. John Mills, a in business at Oldham, for damages amounting to breach of contract. In 1886 the plaintiff purchased ks in Manchester, and desired to fit them up for the of indiarubber sheets. He therefore went to the and gave him an order for three machines—namely, icator," for the purpose of reducing the raw material ; a hydraulic press, by means of which to press into a block; and a cutting machine, with which off sheets of the prepared rubber from the block, re then converted into various articles of commerce. for the machines was given in August, 1886, and dant undertook to supply them in about a month. e "masticator" arrived it was found that it would , inasmuch as in consequence of the porous condi- the cylinder the water which was used got into the d spoilt it. The defendant made a second machine, which was delivered in November, but this was found also not to work, the iron teeth which performed the function of mastication having been put in the wrong way. A third machine was then supplied on the 15th January, which was found to work fairly well. The next machine—the press—was ordered to have a pressure of three tons to the square inch, but it was found to have only a pressure of one ton. As to the cutting machine, the plaintiff made no complaint, but he submitted that in consequence of the delay in getting the machinery he suffered loss in his business, for which he now sought to recover compensation.—The plaintiff and his witnesses having given evidence, Mr. M'Keand said he had a reply, and that while admitting some liability with regard to the "masticator," he should contend that the other machines were properly constructed.—At the suggestion of the Judge, the parties came to an agreement whereby judgment was entered for the plaintiff for £100 damages, and costs.

GREAT ECONOMIES IN THE CONSUMPTION OF COAL.

THE Barrow correspondent of the *Times* states that an invention of the very highest importance to steam-users has been patented by Messrs. Ashworth and Kneen, of Dalton-in-Furness, which, while bringing about an economy of something like 35 or 40 per cent. in the consumption of coal, also secures the total abolition of smoke. The most careful tests by Mr. D. K. Clarke, C.E., testing engineer to the National Smoke Abatement Institution, have demonstrated beyond doubt that the new regenerative furnace will make more steam with a much smaller quantity of coal than is required to be used at present. It can readily be fitted to any boiler, marine included. Further than this, the application of the new furnace to any boiler means the complete abatement of all smoke. The furnace is specially designed to effect the rapid and complete intermixture of the combustible gases which pass from the ordinary furnaces with a supply of heated air, for the purpose of effecting their complete combustion with the entire prevention of smoke. Mr. Clarke states that he witnessed a boiler having the Ashworth and Kneen patent fitted to it fed with ordinary slack, producing absolutely no smoke whatever, and that for a whole day—the evaporation during the same time attaining to 10·975lb., or practically 11lb. of water per pound of coal; while in the case of ordinary boilers, according to Mr. Sennet, a high authority in engineering circles, an evaporated duty from the best Welsh coal, which has considerably more heating power than ordinary north-country slack, usually amounts to something much less than nine or ten pounds of water per pound of coal, nine or ten being the maximum for the best Welsh coal. Mr. Clarke further states that by means of the Ashworth and Kneen system as much as 11·96lb., or practically 12lb., of water was evaporated per pound of Newcastle coal. Messrs. Ashworth and Kneen can evidently give to our navy the boon of smokeless funnels—an important matter, especially in time of war—without resorting to the use of Welsh coal, and at the same time a greater power for developing their engines. It was shown by Mr. Clarke's experiments that the ordinary furnace consumed as much as 23 per cent. more coal per hour than the patent furnace, which also evaporated 25 per cent. more water per hour; consequently 51 per cent. more water was evaporated per pound of coal by the patent system than by the ordinary furnace. The augmented evaporative efficiency corresponded to an economy of 34 per cent. of coal.

R. W. THOMAS AND CO. LIMITED.—Registered with a capital of £20,000 in shares of £1 each. Object, to acquire the business now carried on by Messrs. R. W. Thomas and Co., Thornton Heath, Surrey, as manufacturers of photographic dry plates, collodion, varnishes, and other specialities, and dealers in all kinds of photographic appliances.

DISSOLUTION OF PARTNERSHIP.—Read, Holliday, and Sons, Turnbridge, Huddersfield, Wakefield, Manchester, Glasgow, and Brooklyn, U.S., chemical and dye manufacturers and dyers, as far as regards C. Holliday.

Correspondence.

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Trade Notes.

THE GLASGOW EXHIBITION OF 1888.—The Committee of the Glasgow and West of Scotland Institute of the Scie of Chemistry is giving attention to the extens preparations which are being made for the International Exhibition of Industry, Science, and Art, to be held in Gla gow in 1888. That the Exhibition will not be limited merely in extent, importance, and magnitude, but also in the fact that the citizens at large have subscribed the unprecedently large guarantee fund of £252,000. That this Exhibition will at its chemical department, be not unworthy of the West Scotland, the birthplace of some of the most important chemical industries of the United Kingdom, and also worthy successor of that of Manchester, is anticipated fr the number of local influential chemists and chemical ma facturers who are acting on the Committee. The pres position of Glasgow, as a community, co-equal in ext with Liverpool or Manchester in population, and in t importance of its chemical manufactures, besides being t rendezvous of foreign and other tourists, will, it is hope induce exhibits from all parts of the United Kingdom a elsewhere. The Committee beg to point out the desirabil of illustrating processes on the large scale by models, pl etc., and the desire of the Exhibition authorities to ma scientific apparatus of all kinds a great feature of th Exhibition. Application for space must be lodged with t Secretary of the Exhibition before the 1st of November, the offices of the Exhibition, 27, St. Vincent Place, Glasgo

AFTER MANY DAYS.—The Norwich Town Coun which some years ago expended a sum approaching £200,0 in the construction of sewerage works for carrying off bo surface sewage and sewage proper, have now decided to co struct a separate system for the sewage at a cost of £78,00 The trouble with the present system is the enormous in of spring water into the low level sewer. The irrigati system is to be continued, and the old service of pipes w be used for surface water.

THE COCKERILL IRON AND STEEL CO.—The report the Belgian Cockerill Iron and Steel Company for the p financial year describes the business position of the compa as very satisfactory, and states that the blast furnaces esta lished by the company at Kamenskoy, in Russia, have beg operations. A dividend of 50f. per share is announced.

MR. EDISON AND THE PHONOGRAPH. Mr. Edison sta that, after eight months' steady work, he had made wond ful improvements in his phonograph, by which the hum voice may be stored up and transmitted in the same way letters. The first five hundred instruments will, he hop be ready for distribution by the end of January.

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THE BROXBURN OIL COMPANY.—At a meeting of the Scottish Mineral Oil Association held in the Chamber of Commerce on the 27th ult., it was unanimously resolved to continue supplies to the Broxburn Company on the same basis as agreed to last week, either in the shape of shale or its equivalent in crude oil, etc. The Broxburn Company expressed themselves satisfied with the supplies which have been given, and stated that, while the men were so foolish as not to accept the wages at which they were working to other companies, they could see no alternative but the continuance of the struggle. Amongst several other subjects discussed, a proposal was made to regulate the prices of solid paraffin, but decision as to this was postponed till next week. [It should be explained that this is a matter on which there is considerable divergence of opinion.]

EXPLOSION AT A PETROLEUM REFINERY.—A terrible explosion occurred at Dunkirk on the evening of the 27th ult. in the petroleum refinery of M. Trystram, a member of the Chamber of Deputies. The whole building was soon reduced to ashes, and the flames spread to a timber yard and saw mills adjoining. It is feared that several persons perished in the flames. Seven persons seriously burnt were removed to the hospital.

THE POLLUTION OF LOCH LONG.—We understand that the inquiry by the Government as to the vexed question of the pollution of the waters of Loch Long is still being prosecuted. Captain Coghlan has been sent down from the Admiralty, and with a steam launch belonging to the *Ajax* has recently been engaged taking soundings in the loch. Mr. Fletcher during his visit took as many as seventy samples of the water in Loch Long and the other lochs on the Clyde, and his report will be anticipated with interest.

CHINESE COAL MINING.—An elaborate paper has been furnished to the American Institute of Mining Engineers of the Kaiping coal mines in North China, of which some particulars were given in the *Newcastle Daily Chronicle* some months ago. Some of the particulars given in the later account will have interest to our readers. There are seventeen beds of coal, but only nine are workable. The shafts were sunk with the diamond drill, and are two in number. The downcast was sunk to the depth of 560 feet, and the upcast to the depth of 300 feet. They are walled with limestone cut to fit the circular form of the shaft. A Guibal fan ventilates the mine, and it is worked at a speed of thirty revolutions per minute—the average velocity of the air through the workings is 5ft. per second. The output of coal is 950 tons daily, which is hauled up in two shifts of eight hours each; the coal sells for from 16s. per ton for "best No. 5 dust" up to 32s. per ton for "best No. 5 lump." The following are the daily wages paid in these mines:—

	Candarins.
Interpreters to foreign overmen	15
Pony and mule drivers	15
Sinkers	15
Masons	15
Enginemen	15
Coal miners	11
Door-boys	10
Switch-boys	10
Drain-boys	10
Drum-boys	10
Cantonese boatswains or pump-men	72
Chinese pit deputies	72

These wages seem very low, but it must be considered that the men do only one-fourth the work accomplished by English miners. A candarin is equal to $\frac{7}{10}$ of a penny of British money.

TOBACCO CULTURE.—The London Chamber's Tobacco Trade Section offer two prizes of £50 each for the best examples of tobacco. The conditions are that the tobacco grown in the United Kingdom shall be sent for inspection on or before the 1st March, 1888, and that of other places on or before the 1st December in the same year. The secretary of the Bristol Chamber will be pleased to receive the names of competitors as early as possible, in order that proper storage room may be provided.

PROFESSOR LAURIE ON SECONDARY EDUCATION.—Professor Laurie, in opening the winter session of the education class of Edinburgh University on Wednesday, the 26th ult., lectured on "Secondary Education." He said that when a boy began the work of a secondary school, language should be the leading and purely intellectual study, it mattered not what that boy's future was to be. In Scotland, Latin and the Shorter Catechism, with here and there some mathematical elements, summed up the past history of its education. The mother tongue ought to be the beginning, the middle, and the end of all linguistic instruction. The second subject was the preparation of boys for their specific functions in life. Geography, arithmetic, and mathematics should be taught. All dabbling in physics and chemistry was to be disparaged, unless the subjects were taught by a man of high and exact attainment, and not by the average South Kensington science teacher. What was needed was the appointment of a Commission for the examination of secondary schools and a Treasury grant. With that it was possible to put secondary education in a satisfactory condition within six or seven years, and breathe life and energy into the lifeless body of the Act of 1878. In Scotland never before had secondary schools been as satisfactory as now.

FIRE AT MINEHEAD.—The British Channel Chemical Works, belonging to Mr. Walter Hellier, were totally destroyed by fire on Monday night, the 24th ult. The estimated damage is about £10,000, partly covered by insurance. About midnight Edwin James, who works by night on the premises, observed fire issuing from the machinery department. He at once raised an alarm, and aroused his master, who resides near. In a short time, however, the whole building was a mass of flames. The whole neighbourhood was illuminated, and the hillside set on fire, so great was the heat. Fortunately, the wind was blowing away from the dwelling-house, or it would have been consumed, as it is a wooden structure. The origin of the fire is at present unknown.

THE CHEMICAL TRADE IN GERMANY.—A Magdeburg correspondent says that the manufacture of chloride of potassium in Germany is in a very prosperous condition at present, the syndicate having sold 2,356,243ctr. up to the 1st of October, against 1,884,060 ctr. during the same period of 1886. There remains only 36,214 ctrs. for sale this year.

HOW DOES HE DO IT?—We learn from Philadelphia that Mr. Frischmuth, has established works in that town for the production of aluminium. The manufacture of this metal has hitherto presented considerable difficuly, so that its price was necessarily high. Mr. Frischmuth, it is stated, is already able to supply it at 60c. per ounce, and hopes soon to produce it at a much lower rate.

CHILI AND PERU AS COAL AND COKE MARKETS.—The foreign consul reports that the Chilian market is still firm and prices show an upward tendency. Orell steam is quoted at 27s. 6d., Australian ditto 24s. 6d., and West Hartley at 40s. per ton. Twenty-eight shillings is being asked for foundry coal, Liverpool shipments, but the native article holds its own against this product. Coke sells here at 40s. per ton. Charcoal is quite free of duty, and the only tax on block fuel is one of 15 per cent. *ad valorem* (except of course the difference between the paper and silver piastre claimed by the Customs). In Peru the charcoal tax is 10 per cent. *ad valorem*. Freights run from 16s. to 21s. from Great Britain to Valparaiso, while to Callao they are about 9s. higher per ton. Havre is the great port of shipment, but a great deal shipped there is British coal. Most of the coke is British, the rest German and Belgian. The consumption of coal, coke, and charcoal has considerably increased lately, and these markets are becoming very valuable. They are specially worthy of the attention of the British coal proprietors, as British coal is in great request. The native product is very common, and gives off a lot of smoke.

MESSRS. JAMES GIBBS AND CO. LIMITED.—At the first general meeting of this company a dividend at the rate of 8 per cent. per annum on the 7 per cent. preference shares was declared, and the sum of £2,000 carried to the reserve fund.

STRIKE OF SKINNERS AT COLNE.—The skinners employed by Messrs. S. Smith and Sons, fellmongers, Colne, the largest firm in the town, have struck work with the view of obtaining 2s. 6d. more per week, in accordance with the revised list of prices which came into operation on the 10th ult. The firm have procured machines to perform the work hitherto done by the skinners, who will not in future be required.

THE PRECIOUS METALS.—According to the official returns of the several assay offices for the 1886-87 Birmingham still holds the lead in the manufacture of the precious metals. At the Goldsmith's Hall duty was paid upon 14,802 oz. of gold and 122,703 oz. of silver. This is consumed not only by the gold and silversmiths, but also by the jewellery trade.

THE LEEDS GAS SUPPLY.—Mr. F. R. Spark, in a letter to the *Leeds Mercury*, states as follows:—In Newcastle the sulphur impurities average 5½ grains per 100 cubic feet of gas consumed. In Leeds the average is more than three times this amount.* The last report of Mr. Fairley, the committee's own analyst, showed the illuminating power of Leeds gas to be 16 candles. This, under the old Gas Companies' tests, would have registered 14½ candles only, so that Leeds is actually now supplied with gas at 1½ candles less than the parliamentary standard. The nominal price of our gas is 1s. 10d. per 1,000 feet. But no comparison can be drawn between Leeds and other towns, because nearly all corporations (Leeds is excepted) pay large sums out of the gas receipts into the borough fund, thereby decreasing their rates. In Birmingham, Glasgow, and several other places no meter-rents are charged. If from the gas receipts in Leeds were taken (as at Manchester) £50,000 per year for the borough fund, the price of our gas would be 2s. 8d. per 1,000; or £25,000 a year taken from the gas receipts (as in Birmingham), the price of our gas would be, at least to the working classes, 2s. 7d. per 1,000 feet. The difference between 1s. 10d. and 2s. 7d. is in Leeds paid in rates and meter-rents.

[* We do not know what Mr. Spark would say if he lived in Manchester or Salford, where gas is supplied often containing over 40 grains per 100 cubic feet.—ED. C. T. J.]

ROYALTIES IN COAL MINES.—The Earl of Dunraven, who has large mineral properties in South Wales and Monmouthshire, to which he succeeded on the death of his father a few years ago, has declared himself in favour of a sliding scale arrangement for the payment of royalties due to him from the lessees on his estate as the mineral owner, and in all new leases for working the minerals, instead of the fixed price of ninepence per ton which obtains in the older leases prepared during the lifetime of his father, he has inserted a clause by which the lessee pays to him one-twelfth of the selling price of coal at the colliery as a royalty. This change is regarded as a most important one by the colliery owners of South Wales, and the men have repeatedly urged that this principle should be accepted by the landowners. Steps are being taken to get the clause inserted in all new takings.

FIRE AT AN ALKALI WORKS.—On Friday morning the 28th ult., a fire occurred at the Alkali Works of Messrs. A. G. Kurtz and Co., St. Helens, but through the promptitude and energy of the workmen the damage was confined to about £50.

THE SANITAS TRADE MARKS.—In the Chancery Division of the High Court of Justice on Wednesday, October 26th, Mr. Justice Kekewich had before him the matter of the Sanitas Company *v.* G. Condy, trading as "G. Condy's Sanitant Company," and the "Condisanitas Company." The plaintiffs in the action asked for an injunction to restrain the defendant from using the word "Sanitas" or its derivatives in connection with the goods sold by him. After hearing the evidence which had b ered before him, Mr. Justice Kekewich entirely co th the remarks made by Mr. Justice Kay in his ju d on the evidence given on affidavit. To his r choice by the defendant of the word "Sanita t indication of fraud. He, therefore, without ed the plaintiffs the relief they claimed, and of the action.—[Messrs. Condy and Mitch o be stated that they have no connecti G. Condy.]

SEVERE OPERATIONS OF THE UNITED STATES ALIEN LAWS.—An official intimation on this matter has been issued by the Mayor of Liverpool to the following effect:—It seems to be very imperfectly known that in February, 1885, the United States Congress passed an act to prohibit the importation and immigration of foreigners and aliens under contract or agreement to perform labour in the United States, and in February last a further act amending it. The effect of the two acts together is to subject to heavy penalties any person who prepays or in any way assists the importation or immigration into the States of any alien or foreigner, under any agreement or contract whatever, to perform labour or service of any description, except in the case of temporary residents only engaging private secretaries or domestics; actors, artists, lecturers, and singers, or persons engaged in some new industry for which labour cannot be found in the States. The penalty is a thousand dollars for every alien so brought into the States, whilst the master of any vessel bringing and landing such aliens is subject to a penalty of 500 dollars in each case. If the person is discovered before being landed then the shipowners must take him or her back at the ship's cost, under penalty of not being allowed to further trade at States ports. Serious inconvenience has already arisen to British subjects through ignorance of these laws, and it will be well that all who have relations with the United States should bear their existence and purport well in mind.

COMMENCEMENT OF THE MANCHESTER SHIP CANAL.—The Ship Canal Company have started active operations in the neighbourhood of Ellesmere Port, Cheshire, where are already to be seen several contractors' locomotive engines, waggon loads of timber, numerous huts, contractors' rails, etc.

REDUCTION IN THE PRICE OF GAS.—The Directors of the Gas Light and Coke Company have resolved, from and after the 1st day of January next, to reduce the price of gas to private consumers on the north side of the Thames to 2s. 9d. per 1,000 cubic feet for common gas, and to 3s. 5d. per 1,000 cubic feet for cannel gas. They have also resolved, from and after the same date, to supply the public lamps in the whole of their districts at 2s. 2d. per 1,000 cubic feet for common gas, and at 2s. 8d. per 1,000 cubic feet for cannel gas.

HODGSON'S BREWERY.—The first annual meeting of the shareholders of Hodgson's Kingston Brewery Company was held last week, Mr. W. Mosse Robinson, the chairman, presiding. It was stated that the business has been established on a thoroughly sound footing. An interim dividend at the rate of 5 per cent. was declared some time since, and a further dividend at the rate of 8 per cent. per annum was now declared, making a total dividend of 6½ per cent. for the twelve months, leaving a balance of £2,920 to be carried forward. The sum of £2,500 has been written off for depreciation.

AN ALKALI MANUFACTURER'S WILL.—Probate has been granted to the will of the late Alderman John Williamson, J.P., late of South Shields, chemical manufacturer, and of the Villa Guiseppina Cadenablia, Italy, who died on July 9th last, aged sixty-five years. The value of the personal estate has been declared at £45,263 1s. 7d.. He bequeaths to his nephew Edmund Johnson Garwood, 200 shares of the nominal value of £10,000, in the Jarrow Chemical Company; to his niece, Miss Margaret Ann Garwood, 200 shares in the same company; amongst the three daughters of his sister, Mrs. Mary Stark, 120 shares, of the value of £6,000; to Louisa Fife, at present residing at the Villa Guiseppina, 40 shares of the value of £2,000; and the residue of his personal estate and all his real estate he bequeaths and devises to his wife, Mrs. Ann Williamson, who is the sole executrix.

SUNDAY LECTURES IN MANCHESTER.—Professor Harold Dixon lectured on Sunday last in the New Islington Hall, Ancoats, on "The Chemistry of a Coral." The lecture was illustrated by experiments. Professor Dixon is the successor to Sir Henry Roscoe at Owens College, and son of the late Mr. Hepworth Dixon, who was a Manchester man.

KEEPING RUBBER GOODS.—Soft rubber goods, such as tubing, stoppers, etc., may be preserved by keeping them in tightly-closed tin boxes, containing a sponge or bunch of matting moistened with benzine. Of course this must not come into actual contact with the articles. A plan of softening rubber goods which have become hard and inelastic through exposure and age, by digestion in weak ammonia water is not said to answer.

MINING IN VERA CRUZ.—Consul Baker, writing last month from Vera Cruz, draws attention to the coal deposits of that state. There are, it appears, eighty-two "important" coal mines there. The coal is near the surface, but the seams contain many faults. It could be probably "got for 5s. per ton, and conveyed to the coast for 2d. per ton per mile." The average distance to the coast may be put at fifty miles, so that the price of coal at the coast would thus be about 13s. 4d. per ton—or only about a third of the price of coal there. There is, therefore, in Vera Cruz the capability of a considerable development of mining industry.—From a table of mines discovered in twelve of the eighteen cantons of Vera Cruz, compiled by Mr. Baker, it appears that the total number of mines is 335, of which a large proportion, *i.e.* 226, consist of petroleum, coal, and asphalt, viz. :—

Petroleum	126
Coal	82
Coal and petroleum	5
Asphalt	9
Asphalt and petroleum	3
Asphalt and coal	1
	226

The State is in fact exceedingly rich in mines and minerals, but they have never been seriously worked.

SOCIETY OF CHEMICAL INDUSTRY.

MANCHESTER SECTION.

UPON Tuesday last the opening meeting of the Session 1887-8 of the Manchester section of the Society of Chemical Industry was held at the Grand Hotel, Mr. Samuel Mellor presiding. In opening the proceedings, Mr. Mellor said that there was one subject he desired to call attention to—a subject he thought of great importance for the future welfare of this country—and that was, that we ought as a nation to stop bewailing of foreign competition, and to cease uttering the cry that foreigners were beating us in manufacturing processes both at home and abroad. For his part, he said he did not believe such statements; he was of opinion that Englishmen could very well hold their own against all forms of competition, and he had only to go to the Royal Jubilee Exhibition at Old Trafford to confirm him in this opinion. Mr. Mellor went on to say that no one knew better than himself the serious results which followed in the wake of this kind of talk. Mineral merchants abroad were just now saying to themselves that if England was so much behind the other nations, as she herself seemed to admit, it would be far better for them to send their minerals to those nations who were more advanced in their methods of extraction, and who could probably give more money for the raw material.

Turning to the chemical exhibits at the Exhibition, Mr. Mellor spoke in high terms of praise of the collection as a whole, and if the intense interest with which he viewed the display of chemical and physical apparatus used by the late Dr. John Dalton and by the late Michael Faraday in their researches; but he was a little chagrined to find many of the cases containing products quite foreign to the firms exhibiting them, and though it was not stated that they were really manufactured by the said firms, yet the general public took it for granted that such was the case. Mr. Mellor next called attention to a few of the metallurgical exhibits at the Exhibition, notably the bar of platino-iridium and the aluminium exhibits of Webster's Crown Aluminium Company Limited, observing that he was rather sorry that the exhibitors had not supplied a short description of these objects of interest for the benefit of visitors generally.

Mr. Peter Hart then read a paper on "A method of cooling water for manufacturing purposes." It appeared from this paper that during the past summer some of those manufacturers using water for cooling purposes were in great fear of losing their supply altogether, and therefore it became necessary to economise, an operation it seems they had not thought of before. The heat imparted to the water had of course to be dissipated in some way, and after several trials Mr. Hart hit upon the plan of pumping the water into an overhead trough perforated with small holes, and letting the water fall a number of feet into a tank below. In order to prevent the wind blowing the fine shower over the tank, some battens were nailed over the sides of the scantling supporting the trough, but on alternate sides, so that there was free contact of the atmosphere on one side. The plan was simple, and he found the hot water was thus cooled in amount varying from 20° to 30° F.—Messrs. Grimshaw, Davis, and Cawley took part in the discussion.—Mr. Watson Smith then read a paper on a new antiseptic, which held the same position to naphthol as salicylic acid held to phenol. It was manufactured from sodium naphthol by passing a current of carbonic acid over it when in a heated condition. From the crude salt the acid was precipitated and isolated by treatment with sulphuric acid. Mr. Smith exhibited samples in the pure and crude state, and gave some details of its power as an antiseptic. Its price, he stated, was three shillings and sixpence per pound.

RIVER POLLUTION.

III.

WE cannot walk far in any manufacturing centre without coming into contact with a stream of coloured liquid. In all the woollen centres of Yorkshire it is scarcely possible to find a stream having any near approach to purity, and the same may be said of Lancashire wherever dyeworks and calico printworks are located. To prove the truth of this assertion it is only necessary to observe the river Irk at its junction with the Irwell opposite the Palatine Hotel, in Manchester. As one of the most filthy streams in the United Kingdom it retains its character *par excellence*, and no attempt seems to have been made to mitigate any of the evils known to arise from the noxious character of the ingredients carried down by it both in suspension and solution. During the recent drought numerous sand-banks appeared above the level of the water at the junction of the above two streams, and on one occasion we saw a colony of rats upon one of these banks being stoned by boys, and so noxious was the character of the water that these rats quietly submitted to the stones flung at them rather than take to the water again. We have heard it stated over and over again that the water of the Irk at this point has been used for all purposes of common ink, and that this is quite possible we are certainly inclined to believe.

Up to a certain point, and by the action of certain causes, even colouring matter may disappear in a stream, not by dilution simply, nor by filtration, but by the combined action of oxygen and certain salts which are present in almost all waters to a greater or less extent, and so by the application of this knowledge an artificial purification may be in many cases effected.

We have so far not mentioned the class of works from whom this source of river pollution emanates, but our readers will be able, probably, to furnish the missing information. We do not wish our readers to run away with the notion that because a liquor finding an entrance into a stream is dark coloured, that therefore without any further examination it must be more noxious than one looking perfectly clean, but in many cases the fact goes without further saying.

Dyeworks are the principal sources of dark-coloured effluents, and the principal colouring matter, logwood, combined with iron salts. At present the spent liquors are turned into the nearest stream, watercourse, or sewer, and the intense blackness of the combination gradually stains the river bed: so that even if the water running down is perfectly clear and transparent the underlying deposit makes the water appears quite black to an observer upon the banks. With a cer

amount of colouring matter in solution entirely of organic origin fish will live and weeds will grow, the oxygen liberated from the weeds in sunshine quickly oxidising the colouring matter.

But is well known that neither fish can exist nor can weeds grow in the waste waters from our dyehouses and calico-printworks as they are at present allowed to gain entrance into the river, and why? Simply, because they are highly charged with strong mineral poisons, such as bichromate of potash, arseniate of soda, copper and tin salts, and many other chemicals too numerous to mention. Our readers may ask, Is this waste? to some extent, yes; but in many instances these solutions are residues from which it would not pay to extract the small remaining percentage of active materials. Furthermore, a dyework often bleaches also, and we have already shown that bleaching refuse is of a most noxious character, so far as piscine life and aquatic vegetation is concerned.

It may not be known to every professor of the dyeing art, that, were all the various effluents from his works mixed and allowed to settle, the resulting clear fluid would be far less impure than if each were emitted separately; one chemical acts upon another with the effect that a precipitate is formed, which certainly should not be allowed to gain entrance into the stream. It is our intention later on to deal with this subject in a more complete manner, as we have made many analyses of the water of the river Irwell so far back as 1871, and of various effluents entering it, so that we have means at our command for making a comparison between those days and to-day, and to judge whether there has been any serious increase in the interval. What we desire to point out now is that pollution must not entirely be judged by colour, but that the character of its concomitants must be taken into account in coming to any definite conclusion upon the matter. Taking the effluent coming from an ordinary well-conducted dyeworks, where no bleaching operations are carried on, we say most decidedly that, considering the volume finding egress in each case, it is not more injurious to the stream than the effluent from a bleachworks; but we must qualify this statement in order to prevent misunderstanding, by saying that neither effluent in its crude condition should be admitted to any stream. Later on we shall endeavour to point out methods by means of which these effluents may be dealt with, but at present we must confine ourselves to a description of the various sources of pollution which render our streams such an intolerable nuisance.

The evils which have even now become fully recognised, are much wider spread and more serious than can be appreciated at first sight. We have only to walk up the banks of the Irwell, the Roach, and other tributary streams, to find the bed widening by reason of the floods undermining the banks and washing away many yards of them each year. The noxious water flowing down the stream will not allow grass to grow even on the sloping banks, and there is consequently no resistance to the force of the flood-water when it comes down. If grass could grow, the roots interlacing in the soil would form adequate protection and resist for a long period the scouring action of the winter floods. In country streams of variable flow we find grass growing even below the water's edge, and this is the condition we hope to see attained in the streams flowing in and about our manufacturing towns.

(To be continued.)

THE LIVERPOOL MINERAL MARKET.

THE market has ruled pretty steady during the week. Manganese: imports have been small, but prices are unaltered. Magnesite (containing 98 per cent. of carbonate of magnesia) is continuing to offer freely at 30s. to 35s. for raw lump; raw ground £6. 10s., and calcined ground £10 to £11. In Bauxite (Irish Hill brand) there has been a larger business doing, and prices are well maintained. Lump Connemite, 7s. 6d. per ton at the mines. French chalk: imports are small, but prices are without change, namely, 85s. to 90s. for medium, and 95s. to £5 for best G G B. Barytes (carbonate) continues scarce; selected crystal lump scarce at £6. No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, G G B brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone is unchanged; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Iron ore quiet. Purple ore, 7s. Emery-stone steady at £5. 5s. to £5. 15s. for lump; smalls, £5. Fluor and felspar unaltered. Fullers' earth quiet, at 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda continue quiet. Tungsten metal at 2s. 6d. per lb. Tungsten alloy 2s. per lb. Chrome ore quiet at 80s. to 85s. for 50 %, and 60s. for 40 %. Antimony ore, £8 to £10 for fair quality; best, £18. 10s. Antimony metal, £31 to £32. 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potter's lead: Smalls, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 19s. to 20s. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Plumbago: Best Ceylon lump, £25 to £35; good, £20 to 21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £5 to £15 per ton. French sand, 19s. Ferro-manganese firmer, 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 %, £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8.

THE ALKALI TRADE.

THE alkali trade is just now in a very peculiar position. The bleaching powder convention, which is now freshened up for another year, has just been startled by the news that M. Pechiney, of Salindres, has succeeded in making bleaching powder upon a manufacturing scale from magnesium chloride, and although at present the bleach made by this process in the experimental plant costs more than by the existing process, M. Pechiney expects to reduce the cost considerably so as to bring it down to a workable limit.

Bleach has, nevertheless, been firm during the past week, though we have heard of sales over next year at much below present prices.

Alkali, both carbonate and caustic, is becoming an enigma; we have heard of offers of 70 % caustic to works, on which there is a pound a ton carriage at £7. 7s. 6d. d/d for all next year. With this alkali makers are grumbling, and pointing out "the loss on their saltcake," but they do not seem yet to have realised that *saltcake* is now their bye-product, and that the relative position of their products has undergone a serious change.

THE MISCELLANEOUS CHEMICAL MARKET.

THE general trade throughout the country lacks activity, and prices for this reason remain low, and in many cases unremunerative to manufacturers. Copper, tin, and lead products are slightly affected by the advanced prices of these metals. Sulphate of copper is now quoted £14 f.o.b. Lead salts are firm, but without important alteration in prices. Litharge is dearer: £14. 10s. to £15, according to brand. Acetic acid and acetates all round are in fair demand, with a tendency towards advanced prices for acetate of lime and soda. Supplies from America and the continent are less abundant. Prussiates of potash is well maintained at 7¼d. to 7½d. for foreign and British makes respectively. Bichromates are in good demand without change. Chromic acid, 4d. to 4¼d.

amount of business is being done quietly for 1888 and with the least show of revival in our markets see improved prices in many branches of the trade. s for supplies are to a large extent made at the end ar for the following six or twelve months, and this makes a firmer market. Many purchasers are ncluding business now in anticipation of the usual movement of prices later on.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

TIC soda has further weakened, without any positive al break in price. Bleaching powder for prompt lds late gain, and alum and sulphate of copper are oted higher, the latter in conformity with a firmer the metal market. Sulphate of ammonia continues , and quotations are still the turning lower, the bulk ss done being very limited. Makers of bichromates ly in their grumble at the feebleness of the European but despatch has been over the average to North n ports, an outlet, however, which fetches price considerably lower than those obtained from the fixed home, a circumstance due to the cutting in of the n makers and the import restrictions which protect Mineral oil product quotations, under the disturbing of a prolonged labour dispute, continue to rule high; feature of the past week is ominous of some early this consisting of a greatly enlarged import into of American oil and wax, *vide* the import figures elow. Holders of parcels of Scotch make quote ly as high as a fortnight ago, but business is done at he general chemicals market is dull, although no an during the past few weeks. Prices current are:— stals, 46s. net Tyne; alum, £5, less 2½ °/₀ Glasgow; English refined, £31, and boracic acid £46 net ; soda-ash, 48/52° 1d., less 5 °/₀ Tyne; caustic soda, 76° £9. 5s., 70/72° £7. 7s. 6d., and cream, 60/62° 6d., less 2½ °/₀ Liverpool; bicarbonate of soda, casks, £6, and 1 cwt. casks, £6. 5s., net Tyne; alkali, 48/52° 1⅛d., less 5 °/₀ Tyne; saltcake, 21s. f.o.r. Glasgow; bleaching powder, £8, f.o.r. Glas- chromate of potash 4½d., and of soda 3½d., less °/₀ to Scotch and English respectively; nitrate of 9d. to 9s.; chlorate of potash 6d., less 5 °/₀; sulphate onia, £11, f.o.b. Leith; paraffin scale, hard 2½d., to 2⅝d.; paraffin wax, 3d; paraffin spirit, 7d.; sul- f copper, £13. 15s., less 5 °/₀ Liverpool. Clyde include 2,888 barrels of oil and 2,306 barrels of wax merica), 41,248 bags of sugar, and 220 tons of te.

IE SULPHATE OF AMMONIA MARKET.

markets at all ports are quiet but steady. London £11. 8s. 9d., less 2½ °/₀, and Hull may be taken as 9d. to £11. 5s. Some business has been transacted pool so low as £11, but it is the opinion of many nakers hold well together the bottom has been seen. low prices have arisen from the fact that certain ors sold forward at £11. 5s., and as prices did not early autumn according to their expectations, they lose on their uncovered transactions; their next as, therefore, to absorb all orders coming in at a low o as to allow sellers no outlet, trusting to chance the tide would turn in their favour. It is hardly herefore, that much higher prices will be seen before dle of January in next year.

THE TAR PRODUCTS MARKET.

OIL, both 50/90 and 90's, remain in the same state as ate of our last report, 50/90 standing at 2s. 1d. and 2s. 9d. Solvent naphtha *is getting* scarce, and we hear that 1s. 2d. has been paid for it during the past few days. The tendency is for solvent to remain scarce, as the process of carbonising does not yield solvent naphtha in any quantity, so that the ordinary supply from tar alone will scarcely keep all consumers supplied. Anthracene is still firm, especially for B quality, which is valued now at 11d. per unit. There is springing up a considerable demand for a new tar product (that is, new commercially), pyridine, a liquid basic compound, boiling at 116·7° C. Pitch remains unchanged, with no prospect of any immediate advance.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

14345. THE TYNE ALKALI CO. (Limited) and T. GIBBS. For improvements in the manufacture of hydrate of baryta and of strontia, and the treatment of solutions containing barium or strontium, for the obtainment of compounds threof and other products, and the utilisation of the products so obtained. October 21.

14356. L. GRABAU. For improvements relating to the production of fluoride of aluminium. October 21.

14459. A. BRÜNN. For improvements relating to the production of peptone and maltose or maltose substances. October 24.

14464. G. PITT. A communinication from A. Weinberg, of Prussia. For a new class of diamido compounds and azo colours produced therefrom, and the process of producing the same. October 24.

14489. D. MASON. A communication from V. d'Ostachiewicz and L. de Gerlicz, of France. For improvements in the process and use of substances for the production of alcoholic fermentation. October 25.

14494. W. SPILKER. For improvements in chemical combinations. October 25.

14602. C. NETTO. For improvements in the manufacture of sodium and potassium, and in apparatus therefor. October 26.

14626. J. W. NEWALL. For a method of making gas for heating purposes from tar or oil. October 27.

14646. C. A. BENNERT. For the manufacture or production of coloured compounds or colouring materials. October 27.

14653. W. F. R. WELDON. A communication from A. R. Pechiney, of France. For improvements in apparatus suitable for preparing oxychloride of magnesium. October 27.

14654. W. F. R. WELDON. A communication from A. R. Pechiney, of France. For improvements in apparatus suitable for use in the process of desiccating oxychloride of magnesium. October 27.

COMPLETE SPECIFICATIONS ACCEPTED.

13654. L. GRABAU. For improvements in the manufacture of fluoride of aluminium, and the double fluoride of aluminium, and an alkali. October 25.

14729. H. MACKAY. For improvements in the preparation of oils for medicinal purposes. November 13.

14840. J. YOUNG. For improvements in carbonising or distilling coal or shale. November 16.

16827. H. VIVIAN. For improvements in apparatus for the manufacture of refined sugar, applicable also to the manufacture of glucose, starch, and similar products. December 22.

276. C. T. KINGZETT. For improvements in the production of solutions for use as antiseptics, disinfectants, deodorants, oxidants and general sanitary reagents. January 7.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
ACIDS:—			
,, Acetic, 25 °/₀ ... ... per cwt.	0	10	3
,, ,, Glacial ... ... per lb.	0	0	6⅞
,, Arsenic... ... ... per cwt.	0	12	9
,, Chromic 70 °/₀ ... ... per lb.	0	0	4
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	9
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	2¼
,, Oxalic ... ... ,,	0	0	4
,, Sulphuric (fuming 40 °/₀) ... ... per ton	12	0	0
,, ,, (Brimstone 168°) ... ,,	4	5	0
,, ,, (Pyrites 168°) ... ... ,,	3	7	6
,, ,, (spent oxide 168°) ... ,,	3	17	6
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	1	15	0
,, Tartaric ... ... per lb.	0	1	6¾
Arsenic, white powdered ... ... per ton	10	12	6
Alum... ... ... ,,	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3⅝
,, = 24° ... ... ,,	0	0	1⅞
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per ton	22	0	0
,, ,, (sal-ammoniac) ... per cwt.	34/- & 32/-		
,, Sulphate (grey), London ... per ton	11	7	6
,, ,, (grey), Hull ... ... ,,	11	3	9
Aniline Oil ... ... per lb.	0	0	9¼
,, Salt ... ... ,,	0	0	8
Antimony... ... ... per ton	35	0	0
,, (tartar emetic) ... ... per lb.	0	1	0
Barium Chloride ... ... per ton	7	10	0
,, Carbonate (native) ... ... ,,	4	0	0
,, Sulphate (native levigated) ... ,,	3	5	0
Bleaching Powder, 35 °/₀ ... ... ,,	7	12	6
,, Liquor, 7 °/₀ ... ... ,,	2	12	6
Bisulphide of Carbon ... ... ,,	12	5	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... ,,	0	3	9
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. London, per unit per cwt	0	1	3
Benzol, 90 °/₀ ,, ... per gallon	0	2	9
,, 50 °/₀ ,, ... ,,	0	2	1
Carbolic Acid (crystallised 35°) ... per lb.	0	1	1½
,, (crude 60°) ... ... per gallon	0	3	10½
Creosote (ordinary)... ... ... ,,	0	0	1
,, (filtered for Lucigen light) ,,	0	0	2
Crude Naphtha, 30 °/₀ @ 120° C. ,,	0	0	10
Grease Oils, 22° Tw. ... ... per ton	1	7	6
Pitch, f.o.b. Liverpool or Garston ... ,,	0	11	6
Coke-oven Oils (crude) ... ... per gallon	0	0	1½
,, (distilled) ... ... ,,	0	0	2
Copper (Chili bars) ... ... per ton	44	5	0
,, Sulphate ... ... ,,	13	17	6
,, Oxide (copper scales) ... ... ,,	38	0	0
Glue ... ... per cwt.	1	15	0
Glycerine (crude) ... ... per ton	33	0	0
,, (refined) ... ... ,,	55	0	0
Iron (turnings)... ... ... ,,	1	13	0
,, Peroxide (blue billy) ... ... ,,	0	7	0
,, ,, (bog ochre) ... ... ,,	1	13	0
,, ,, (precipitated ... ... ,,	3	0	0
,, Sulphate (copperas) ... ... ,,	1	2	6
,, Sulphide (antimony slag) ... ... ,,	1	0	0
[illegible] for cash ... ... ,,	13	15	0
[illegible]e (white) ... ... ,,	27	0	0
(brown ... ... ,,	19	10	0
[illegible]e ... ... ,,	22	10	0

	£	s.	d.
Lime, Acetate (brown) ... ... per ton	9	15	0
,, ,, (grey) ... ... ,,	13	10	0
Magnesium (ribbon and wire) ... ... per oz.	0	2	6
,, Chloride ... . per ton	2	7	6
,, Carbonate .. .. per cwt.	1	17	6
,, Hydrate ... ... ,,	0	10	0
,, Sulphate (Epsom Salts) ... per ton	2	10	0
Manganese Sulphate ... . ,,	19	10	0
,, Borate .. .. per cwt.	2	5	0
,, Ore, 70 °/₀ ... ... per ton	2	10	0
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	4
Naphtha (Wood), Solvent ... ... ,,	0	4	1½
,, ,, Miscible, 60° O.P. ... ,,	0	5	4½
OILS:—Castor ... ... per cwt.	1	4	9
Cotton-seed ... ... per ton	20	10	0
Linseed ... ... ,,	18	5	0
Lubricating, Scotch, 885°—890° ... ,,	6	10	0
Petroleum, Russian ... ... per gallon	0	0	5½
,, American ... ... ,,	0	0	6
Silver (metal) ... ... per oz.	0	3	7½
,, Nitrate ... ... ,,	0	2	8
STARCHES:—			
Sago ... ... per cwt.	0	8	9
Potato (farina) ... ... ,,	0	10	3
Sodium (metal) ... ... per lb.	0	6	0
,, Carb. (refined Soda-ash) 48 °/₀ per ton	5	0	0
,, ,, (Caustic Soda-ash) 48 °/₀ ,,	3	17	6
,, ,, (Carb. Soda-ash) 48 °/₀ ,,	4	2	6
,, ,, (Soda Crystals) ... ... ,,	2	10	0
,, ,, (Crystal Carbonate) ... ,,	5	6	3
,, Chlorate ... ... per lb.	0	0	7½
,, Borate (Borax) ... ... per cwt.	1	9	6
,, Bichromate... ... ... per lb.	0	0	3½
,, Hydrate (74 °/₀ Caustic Soda)... per ton	8	2	6
,, ,, (70 °/₀ Caustic Soda)... ,,	7	5	0
,, ,, (60 °/₀ Caustic Soda, white),,	6	5	0
,, ,, (60 °/₀ Caustic Soda, cream),,	6	1	3
,, Bicarbonate ... ... ,,	5	17	6
,, Hyposulphite ... ... ,,	5	5	0
,, Nitrate (95 °/₀) ex ship Liverpool per cwt.	0	8	10½
,, Silicate (glass) ... ... per ton	5	10	0
,, ,, (liquid, 100° Tw.)... ... ,,	4	7	6
,, Sulphate (Salt-cake) .. .. ,,	1	2	0
,, ,, (Glauber's Salts) ... ,,	2	0	0
,, Sulphite ... ... ,,	5	15	0
Potassium (metal) ... ... per oz.	0	3	10
,, Bichromate ... ... per lb.	0	0	4½
,, Carbonate, 90% ... ... per cwt.	0	18	0
,, Chlorate ... ... per lb.	0	0	6 1/16
,, Hydrate (Caustic Potash) ... per ton	22	0	0
,, Nitrate (refined) ... ... per cwt.	1	2	0
,, Prussiate Yellow ... ... per lb.	0	0	7½
,, Sulphate, 90 °/₀ ... ... per ton	9	15	0
,, Muriate, 80 °/₀ ... ... ,,	8	10	0
Strontium Hydrate, 98 °/₀ ... ... ,,	7	0	0
Sugar, Beet ... ... per cwt.	0	12	3
,, Cane ... ... ,,	0	17	6
Sulphocyanide of Barium ... ... per lb.	0	0	6
,, Ammonium ... ... ,,	0	0	9
Sulphur (Flowers) ... ... per ton	9	5	0
,, (Roll Brimstone) ... ... ,,	5	15	0
Superphosphate of Lime (28 °/₀) ... ... ,,	2	0	0
Tallow ... ... ,,	23	10	0
Tin (metal) ... ... ,,	122	0	0
,, Crystals ... ... per lb.	0	0	7½
Zinc (Spelter) ... ... per ton	16	5	0
,, Chloride (solution 96° Tw.) ... ... ,,	5	15	0

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TO ADVERTISERS.

AL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

rst week of the approaching New Year we shall **ECIAL NUMBER** of the **Journal.** We pro-ig our first volume to a close with the last Saturday er, 1887. The issue of January 7th, 1888 (No. 33), ence Volume II. It will be an enlarged special very general interest. We shall issue along with **-page** and **Index** for the first volume, together t and useful **Office Almanac,** suitable for our , which is now in course of preparation.

g our regular subscribers, our New Year's Number ed to **NOT LESS THAN 10,000 FIRMS AND UALS,** so that intending advertisers will see at this issue is worthy of their special attention.

explain that in our Publishing Department, we y carefully compiled lists—in most cases the result knowledge and information at our command—of of repute, both at home and in the main trading oad, connected with the various industries whose is our *province to serve.* We utilise these lists week by week, by selecting a number of them in turn, and sending out free copies of the Journal to those firms who have not yet become annual subscribers. The result is that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of the New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO,** numbering altogether, as we have stated, not less than **10,000** names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

THE MANCHESTER ROYAL JUBILEE EXHIBITION.

THE PROPOSED COMMERCIAL AND TECHNICAL MUSEUM.

THE "Gem of the Jubilee" as Mr. *Punch* would have it, is now a thing of the past, and as all other Exhibitions have come and gone, so also passes away the Royal Jubilee Exhibition of Manchester; but with this exception, that whereas many provincial exhibitions have aforetime yielded nothing but disappointment and loss, the late exhibition in Manchester has produced a handsome profit.

At a meeting of the executive committee held on Wednesday, the 2nd inst., it was announced that the surplus would amount to from £35,000 to £40,000. Naturally, the question was raised, What should be done with so handsome a surplus? and we believe it was unanimously agreed to support a proposal made by Sir Joseph Lee to found a Commercial and Technical Museum in Manchester, and to invite the exhibitors to form the nucleus of such a collection. Mr. Levinstein, as chairman of the Chemical Section, raised the question—in the event of the idea being carried out—whether exhibitors would be allowed to place their names upon their show-cases, which we believe was answered in the affirmative.

There is no doubt, but, that if the proposal made by Sir Joseph Lee covers the cream of the exhibits in all sections of the exhibition it is a most commendable one, and a step we feel sure will be acquiesced in by all the more important manufacturers of the Manchester district, who will only be too willing to show permanently to the world that the Manchester district is second to none as a manufacturing centre; but such a step as is about to be taken at the instance of the executive committee should not be taken unadvisedly and without great deliberation, and certainly not without previously taking the exhibitors into their confidence, as to what it is proposed to do, and the means whereby the project is to be carried into execution.

We are not aware whether the exhibitors in all the sections of the late exhibition have been appealed to for the loan of their exhibits, but those who placed cases in the chemical department have received a circular, signed by the chairman and vice-chairman of Section III. asking this question, and as the replies will no doubt require some consideration, we feel we shall be reflecting the opinions of many of the oldest-established manufacturers of the district in placing a few facts before the trade, especially as the exhibitors in Section III. of the late Royal Jubilee Exhibition are, with very few exceptions, on our list of subscribers.

It must not be forgotten that Manchester itself was but poorly represented in Section III. Had it not been for the splendid cases from Widnes, St. Helens, and Liverpool; from Birmingham, London, and the Continent, the formation of a section representing the Chemical and Allied Industries would have been a veritable fiasco. To anyone who k

really studied the exhibits in this section the fact goes without saying, and very many visitors from a distance have marvelled at those manufacturers who have been conspicuous by their absence. Had they been near the inner circle they would have ceased to wonder, as it is quite certain—and this fact should be well weighed by the thinking men of the general committee of the exhibition—that the committee of the Chemical Section, as at present constituted, does not command the confidence of all the present exhibitors, not to mention those eminent and old-established manufacturers whose dissatisfaction has led them to hold aloof from the exhibition altogether. We believe that this stricture cannot be passed upon any other committee of the late Manchester Royal Jubilee Exhibition, and we have only kept silence so long upon the subject in order that an apparent unanimous feeling might seem to outsiders to reign supreme, as we were not willing that anything should fall from our pen which would tend in any way to mar the success of such a vast undertaking.

But it is now time to speak out plainly, and the proposal we advocate—as one we feel sure which will meet with general approval by the trade, if not acceptation by the powers that be—is that any government of permanent exhibits of articles illustrating the chemical and allied industries should be entrusted to a new committee, and that not only the exhibitors but the whole trade should be called together to express their opinion upon the appointment of such a committee. We are strongly of opinion that there are in the ranks of our English manufacturers gentlemen of position and high public spirit and possessing the needful ability and comprehensive knowledge of the entire trade, who would willingly place their services at the disposal of the general committee, if this new project were only placed on a footing that would command the general approval of the parties interested.

We have already alluded in these pages to the incorrect classification of many of the exhibits in the Chemical Section, and to the way in which, what were strictly chemical exhibits were shelved into some miscellaneous group, and objects foreign to this department introduced without rhyme or reason. Who has been responsible for this?

We have also called attention to the earnest labours of Mr. Watson Smith in promoting the interests of the Chemical Section of the Exhibition, and we hope it may be possible for the general committee in some form or other to recognise the very valuable aid he has rendered them. Without *his* help we have no hesitation in saying—from actual knowledge of the opinions of many manufacturers in this district—that the success of the chemical department of the Exhibition would not have been as well marked as it has been.

There can be no doubt there would be many more chemical manufacturers willing to fall in with the idea, and exhibit in a permanent museum if the existing circumstances were changed or modified, and it is necessary, if the trade is to be fully represented, that the exhibits should be under the management of a committee fairly representative of the several industries, which we maintain is not the case as the committee is at present constituted. If the committee does not represent and command the confidence of the trade, it is easy to see how grave abuses may creep in to the manifest prejudice of those exhibitors who are not in the fortunate position of having friends at court.

We now ask the exhibitors the question—granting for a moment the advisability of the establishment of a permanent museum of chemical exhibits, which we venture to think none will gainsay—whether in their opinion the matter has been gone about in the right way? If they decide, Yes, we meekly bow to their decision, and shall say that we have very much mistaken the method by means of which such objects of public character and utility should be attained in this country; but we should at all events console ourselves under the circumstances with the reflection that we were departing from English customs and adopting foreign notions.

Before we close these few remarks, we would wish to make it known that there are some members upon the *committee* of the Chemical Section we would be sorry to *see removed or unrepresented* on any new committee, knowing as we do the able, and at the same time, quiet and unostentatious manner in which they have fulfilled their duties. It would be invidious on our part to mention names, but they may rest assured that the trade appreciate their unselfish labours, and we feel sure that they will willingly accept the *bonâ fides* in which this article has been written. We write for the benefit of the entire trade, our object being the greatest good for the greatest number, and if the establishment of a commercial and technical museum in Manchester becomes an accomplished fact, we, on behalf of the chemical and allied trades, shall be ready to tender to Sir Joseph Lee our warm acknowledgements, not only for his great services in connection with the exhibition, but for the happy and valuable idea he has thrown out at its close.

NOXIOUS VAPOURS.

On Tuesday evening, November 8th, Mr. A. E. Fletcher, Her Majesty's chief inspector of alkali works, delivered a lecture in one of the rooms of the Young Men's Christian Association on "Present legislation on noxious vapours, with suggested improvements." Mr. Herbert Philips, the president of the Manchester and Salford Noxious Vapours Association, presided. In introducing the lecturer, the chairman remarked that the subject of chemical vapours was exceedingly interesting to Manchester, as the number of works from which chemical fumes were given off was considerably increasing, and some people even entertained the fear that the evil would be increased after the Ship Canal was made, owing to the chemical works which would spring up on its banks, and Manchester would thus be exposed to noxious vapours from another side of the city. It was clear, therefore, that the citizens were considerably interested in the effectual working of the alkali acts. Mr. Fletcher showed in his lecture the state of the law with regard to noxious vapours, and remarked that legislative action for the suppression of the evil dated as far back as the reign of Edward II., when a proclamation was issued forbidding the use of coal in London on account of the smoke that was emitted in its combustion. With regard to recent legislation, he said that the Act of 1881 was a great advance upon the Acts of 1863 and 1874, as the principle was introduced of compelling the manufacturers to employ the best known methods for avoiding a nuisance, and a number of manufacturing processes were brought within its scope in addition to those connected with alkali works. Experience had shown that the list of works to which the Act ought to apply was incomplete. His opinion was that there should be no list at all, and that the owner of any works should be compelled to use the best practical means of preventing a discharge in the atmosphere of offensive gases. This would at once bring under inspection all works which were known to emit noxious vapours. With regard to black coal smoke, his opinion was that this evil might in all cases be avoided by the use of proper appliances.—On the motion of Mr. Herbert Philips, a vote of thanks was presented to the lecturer.

The Explosives Act.—Thomas Bennett, of Weamen-street, Birmingham, was summoned for keeping 93lb. of fireworks upon his premises, he being only licensed to keep 50lb. Richard Price, inspector of explosives, stated that he visited the defendant's premises on the 29th ult., and found 93lb. of fireworks strewed all over the front room. On the previous Wednesday he had visited the premises, and found fireworks there in excess, and had told Mrs. Bennett to get them away. Defendant should have known better, as he had previously been fined for infringing the Explosives Act.—Mrs. Bennett, who appeared instead of her husband, said the excess was due to the fact that she had just had the fireworks sent in to make up some orders. They would not have remained on her premises long.—The magistrates ordered the defendant to pay 2s. for every pound in excess (£4 6s.) and costs, and Inspector Price was ordered to confiscate the fireworks.

E ANALYSIS OF TRADE PRODUCTS.

IV. TESTING ALKALIES.

nate of Potash is, unlike carbonate of soda, not d by the percentage of alkali it contains, but to the amount of real carbonate, and the artificial is generally guaranteed to contain 90 per cent. ial carbonate of potash often contains carbonate of ich, of course, is a serious matter for the purchasers eing that the one is worth over £18 per ton, while of soda is but one-fourth the price. It would be lt a task to attempt to show the beginner, at pre- ast, how to determine the percentage of these two carbonates, so we will content ourselves with show- a carbonate of potash may be examined which may ably expected to be free from sodium carbonate.

case weigh off 69·1 grammes of the sample and dis- vater, making up finally to one litre, at a temperature C. or 60° F. If not clear, filter some of the solution beaker, and take off 50 c.c. with a pipette; intro- to a flask of about 150 c.c. capacity, and add litmus nal sulphuric acid until the point of neutrality is d, boiling occasionally during the addition of the to expel the carbonic acid, which would interfere colour reaction. The number of c.c. of normal acid used from the burette multiplied by two indi- percentage of carbonate of potash in the sample.

c Potash.—All that has been said respecting the of soda salts in carbonate of potash holds equally caustic potash also. Still, if the absence of soda assumed, the determination of the percentage of kali is an easy matter. The method already given ting the percentage of alkali (total alkali) in caustic be followed with caustic potash; but the quantity ghed off in this case so that every c.c. of normal acid may be equivalent to 1 per cent. of potash is ames.

y instances, we have known of caustic potash and ic soda being sold to users in concentrated solution, n has been a field for the exercise of much fraud he unwary consumer. No solutions of this kind purchased without examination of them, which in l soda solution, may easily be done.

c Soda Solution.—Weigh off 31 grammes of the and dilute with distilled water to a litre. Take out with a pipette and place in a small porcelain dish, solution, and finally run in normal sulphuric acid urette until the full blue has been changed to the t. The number of c.c. used from the burette will he percentage of soda by weight. We wish to al attention to the fact that the solution to be tested weighed, and not measured. Although 31 c.c. of ghs 31 grammes, this is not the case with caustic r; if the solution be measured without taking the avity into account the solution will be made to much stronger than it really is, a fact we know is pening in some works "testing rooms" wherein the regularly "tested."

dent may now prepare another normal test solution,

l Nitric Acid.—Take 75 c.c. of pure nitric acid, y be obtained from Messrs. Philip Harris and Co., ll Ring, Birmingham, who make this pure acid a and dilute to nearly a litre. When cooled to 15·5° exactly to the litre, and titrate it in the manner plained with the normal caustic soda solution, with should be made to correspond, to a drop. One c.c. of the normal caustic soda solution should con- tly 100 c.c. of the normal nitric acid. The method lime and its carbonate will sufficiently illustrate the acid.

f Lime is employed in many industries, and the n use to ascertain the strength of it are not always o find the exact strength, weigh off in a 100 c.c. nknown quantity taken off during brisk agitation of We will *suppose the quantity in this instance to* weigh 3·5 grammes. Add normal nitric acid from a burette c.c by c.c. until a clear solution has been obtained by the dissolving up of the alkaline earth. When this has occurred, boil for a short time to expel any carbonic acid which may have been present, add a few drops of litmus solution, and run in from a burette, drop by drop, the solution of normal caustic soda until the neutral point is reached; when this is ascertained, read off the burette and subtract the number of c.c. used from that of the acid originally employed, and the remainder will be that quantity of normal acid actually employed to dissolve and neutralise the weighed quantity of milk of lime. To bring this number to percentages, the number actually used (call it x) must be multiplied by 2·8 and divided by the quantity of milk of lime weighed off. Carbonate of lime, magnesia, carbonate of magnesia, strontia, carbonate of strontia, baryta, and carbonate of baryta may all be examined by this method, and the following table will show the quantities that should be weighed off in order that every c.c. of acid neutralised shall indicate one percentum of the substance indicated:—

Name of substance.	Formula of substance sought.	Grammes.
Caustic soda	Na_2O	3·10
Carbonate of soda	Na_2CO_3	5·30
Caustic potash	K_2O	4·71
Carbonate of potash	K_2CO_3	6·91
Lime	CaO	2·80
Carbonate of Lime	$CaCO_3$	5·00
Magnesia	MgO	2·00
Carbonate of magnesia	$MgCO_3$	4·20
Strontia	SrO	5·17
Carbonate of strontia	$SrCO_3$	7·37
Baryta	BaO	7·65
Carbonate of baryta	$BaCO_3$	10·05

(To be continued.)

MR. BRUNNER, M.P., AND THE SOCIALIST.

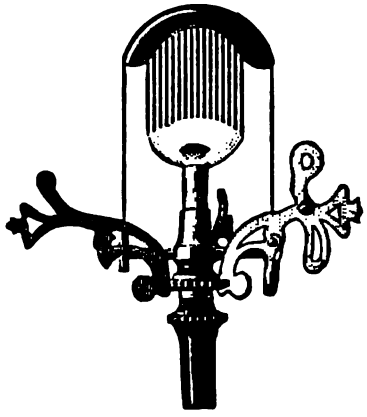
At a recent political meeting Mr. Brunner stated that since his election for the Northwich division the Socialists appeared to have made a dead set against him. They said that his claim to represent working men was a fraud and a sham. Well, he might rest content with his reputation among his neighbours; but he had come to the conclusion that in this matter he owed a duty, not only to his neighbours, but to the Liberal party, for Mr. Champion's mis-statements about him and about his business had been circulated with great industry in every place in the country where he had been speaking lately. He was going to deal with Mr. Champion's statements. He said that he (Mr. Brunner) was a tyrant, who worked men on an average twelve hours a day throughout the year for 18s. per week. Now, that was not true. He was now among his own people, and those before him knew better. He did not know exactly what was the minimum wage for shift work at Sandbach, but it was more than 18s. per week. Further than that, he became convinced three or four years ago that they, the directors of Brunner, Mond, and Company Limited, were doing an unkind and unwise thing in working men 365 days in the year, and he proposed to his colleagues—and the proposition met with very cordial acceptance—that every man who worked steadily during the twelve months should have a week's holiday and a week's pay with it. He would therefore leave them to judge whether he was such a terrible tyrant or not. Mr. Champion went on to say that he (Mr. Brunner) was carrying on a business so unhealthy that no man who was engaged at the works with which he was connected could live more than three years. Well, he knew a great many who were lads twelve years ago, and were to-day with them, fine broad-shouldered fellows. There were men present that evening who had grown grey in the service, and were as hearty as he was. He knew there were corners in the works that were not as they ought to be for men to work in, and he had been occupied for many and many an hour for years past in endeavouring to improve the

[illegible] alkali [illegible] reasons [illegible] other [illegible] four. [illegible] money by [illegible] wages [illegible] profits had [illegible] partner's [illegible] member for [illegible] respect- [illegible] support a [illegible] put his [illegible] any man [illegible] trade union had [illegible] knowledge, and [illegible] done a single [illegible] union. Mr. Ver- [illegible] stated at the last [illegible] which he would close [illegible] shown that, if used, [illegible] infraction of the [illegible] statement. He [illegible] and he had not [illegible] shareholders of the Com- [illegible] that. The statement

[illegible] GAS.

[illegible] commencement of this series [illegible] in America solely for [illegible] is not the case in Germany, [illegible] entertained for a moment [illegible] petroleum residuum required [illegible] water-gas plant at Essen, merely [illegible] metallurgical purposes was con- [illegible] water-gas produced was [illegible] apparatus. But the [illegible] ere it was found that [illegible] air, burnt at a very high [illegible] in the open water-gas [illegible] showing a temperature [illegible] temperature which had been [illegible] fed with coal-gas being [illegible] platinum wire cannot be [illegible] to be accounted for on [illegible] water-gas is richer in car- [illegible] illuminating gas; but the high [illegible] mainly from a more rapid [illegible] this a smaller flame sur- [illegible] consequently there is less loss [illegible] gas flame consuming a [illegible] least six times the surface [illegible] although theoreti- [illegible] ing gas developes [illegible] nevertheless the [illegible] in consequence [illegible] ay be well to [illegible] been assumed [illegible] ble of de- [illegible] has only [illegible] (See [illegible] 85.)

In a small experimental furnace, working w[illegible] and cold air, basic pig-iron was melted without [illegible] while platinum was soon brought to a welding [illegible] best proof of the high temperature which is gener[illegible] gas u[illegible] tion, [illegible] gather [illegible] inspec[illegible] Fahne[illegible] sia in [illegible] light, [illegible] the [illegible] illustr[illegible] Fro[illegible] tion [illegible] at our [illegible] Mr. [illegible] Staffo[illegible] we h[illegible] allude [illegible] for th[illegible] of th[illegible] Water [illegible] Dortm[illegible] seen t[illegible] heats



FAHNEHJELM BURNER.

small magnesia sticks or rods to a state of incan[illegible] produces a light at once whiter than the electri[illegible] but without the bluish tinge of the arc-light, co[illegible] all the descriptions of light now in use it a[illegible] nearest to daylight, and it also possesses the a[illegible] it is perfectly still or non-flickering. This is [illegible] by the fact that there is always a certain am[illegible] matter in the state of incandescence which dem[illegible] time for cooling down, acting as a reservoir or [illegible] so to speak, and thus equalising any variation i[illegible] tion of the gas.

For the same quantity of light emitted, t[illegible] water-gas consumed is only equal to that of [illegible] coal-gas. On a gas consumption of 5 cubic fe[illegible] magnesia-comb gives out a light of 20 to 22 [illegible] fifty hours 15 candles, and after one hundred hou[illegible] The magnesia combs cost about 1¾d. each, so [illegible] of them per 1,000 cubic feet of gas consume[illegible] threepence. These magnesia combs have bee[illegible] designed to match the shape of the flame, while [illegible] impede its free development. That the water-[illegible] illumination is a practicable operation we c[illegible] testify, as we have had the pleasure of seeing t[illegible] of Messrs. Schultz, Knaudt, and Co., at Essen [illegible] up by means of this system with over 300 w[illegible] lights.

With water-gas incandescent lighting, the [illegible] differences in shades of colour can be distinguis[illegible] as in good daylight, a fact easily demonstrated b[illegible] at Stafford, where he has many of these incan[illegible] in action. We now come to the question, Wh[illegible] cubic feet of water-gas cost?

(To be continued.)

GAS-TAR AND ITS USE

VII.

THE combustion of gas-tar and its utilisation [illegible] been very well carried out by Mr. Charles C. [illegible] the Vauxhall station of the South Metropolitan [illegible] answer to inquiries, Mr. Carpenter informs us th[illegible] fitted up for consuming tar are six in number, [illegible] oval "through" retorts in each bench. The sis [illegible] upon one side only burning tar, while the six on [illegible] side are fired with coke in the usual way. As [illegible] is divided by the middle wall, the arrangement [illegible] comparison of the heats each time the retorts ar[illegible]

No alterations were made to adapt either setti[illegible] to burn tar, the firebars being simply covered [illegible]

flat to form a bed for the reception of the tar facilitating the measurement of the quantity of med, it was pumped alternately from two tanks pacity on the stage into a tank above the settings the supply from each furnace was drawn. The introduced into the furnace immediately below rame, one door being broken in halves to allow h also gives the necessary supply of air for com- e being admitted elsewhere. The tar is injected steam, the nozzle of the injector pointing down- is the firebrick paving over the firebars, the inclined about 25° from the horizontal. The ugh the central tube of the injector, the steam e annular space outside.

r is of course less than in firing with coke, as inkering required, the only manual labour neces- occasionally rake out the unconsumed ash. As the comparison is between 20 per cent. of coke ons of tar, which is a ratio of 1·8 to 1·0. This these settings (they are not the most economical) of coke, or 30 gallons of tar per ton of coal

Whittaker, secretary and manager of the Wake- , has informed us that for several months at the 1886 he was not able to realise the price for tar ous of obtaining, and therefore used the tar as urnaces by this method with every success. With er ton (their sale price) he utilised the tar at a onding to 9s. 6d. to 10s. per ton, but having contract for the sale of it above that figure, the uel has been discontinued.

Heydon, the manager of the Gas department field Commissioners, and a portion of whose have already illustrated, writes to say that in tar as fuel for heating retorts and for the purpose steam. For heating retorts, as little as 2½ our per furnace was the quantity employed, and boiler about 3½ gallons. Mr. Heydon says eas have been put forward as to the best way of and some theorists have denounced the use of a distributor, but his experience has shown him to burn tar economically it must be divided or ms, and the use of a steam-jet, or compressed divides, but supplies the oxygen necessary to est combustion. A piece of cast-iron may be few moments if placed in front of a steam tar t is scarcely possible says Mr. Heydon to obtain of heat without the aid of a blast.

btained, as above described, is too excessive for s, and to modify it the supply of air should be lated. In firing steam boilers with tar the heat great, as the plates of a boiler tube will take y amount of heat without injury, provided the d and the tubes kept free from scale. Mr. s that in his case of firing boilers with tar the removed, and the heat from the burning tar ay upon the whole surface of the boiler tube. rt furnaces no coke whatever was employed, tar sed; but in the boiler tube a small coal fire was ensure the tar spray being always ignited.

(To be continued.)

RIVER POLLUTION.

IV.

st article we called attention to the pollution r rivers and streams by dyeworks and calico- blishments. Of necessity the pollution from rces must ever vary. Fashions change, causing appear, and the ever-increasing restlessness of facturers brings new products into the market, detriment of some old and well-established t, nevertheless, we believe that all these changes nents are for the benefit of mankind, and where have been snuffed out of existence it has been owing to the neglect of some economical principle which should have found place in the manufacturer's creed.

In the present article it is our intention to treat of the pollution caused by paper manufacturers. Like most other industries, paper-making has seen some remarkable changes during the past fifty years. At one time rags were the sole raw materials from which paper was made in the United Kingdom, and these being boiled with a very weak alkali contributed but little to the pollution of the stream. Then came the introduction of esparto grass, straw, and in later years pulp made from wood, both by chemical and mechanical processes, so that the character of the effluent from paper mills is a very different one to what existed fifty years ago. Moreover, all that has been said with regard to the noxious character of bleaching effluents applies with equal force to that from paper mills. Bleaching powder is used in very large quantities, and we think we are correct in stating that in many mills fully one-seventh of the active chlorine compound passes away unused and finds entrance into the stream.

But by far the greatest source of pollution is caused in paper mills by the emission of the waste esparto liquor, which is a nuisance so vile in its character that legislation should put a stop to it at once, as there is no reason whatever why such a source of pollution should continue. Even on pecuniary grounds the loss of this liquor is a loss to the manufacturer; but we feel sure that in many cases the pollution will continue until action is taken to restrain it, either by the riparian owners or by the various corporations and local boards through whose districts the streams flow. If an edict were issued to-morrow to the effect that six months hence all fluids resulting from the treatment of fibrous materials with chemicals were prohibited from entering a stream, the paper manufacturer would be an absolute gainer, as the recovery of the waste and offensive substances can be so conducted as to leave a very handsome profit.

In Scotland the riparian owners have compelled the paper manufacturers to keep these highly polluting liquids out of the stream, and it is well known that the Scottish paper industry has not suffered one *iota* from what in England would perhaps with our restricted notions of freedom of trade, be considered an oppressive action. It is true that in England many paper manufacturers have for some time kept the bulk of their pollutions from finding entrance into the stream, but we are also very well aware that there are still many works (some even on the Irwell and its tributaries) where not the slightest attempt has been made in any way to mitigate the evils resulting from the introduction of waste liquors into the river. For many years now we have been connected with the subject of river pollution. In 1871 we made a large series of experiments on the effluents from paper mills and the possibility of the recovery of the chemicals therefrom, and we were then quite satisfied that such an operation was possible. One mill from which we drew samples at that time was using about ten tons per week of soda-ash, which brought out not less than twenty tons of organic matter from the esparto grass. In all, there would be about thirty tons of waste matter going into the river weekly, and it may be added that since that date the working capacity of the mill has been increased, and no attempt whatever has been made up to the present day to prevent river pollution. During this period this one mill has sent into the river not less than 24,000 tons of solid matter, which, if it had been prevented by Act of Parliament, might have resulted in a gain of over £14,000 to the owners.

We have already stated that many paper manufacturers during the past few years have taken action to prevent the fouling of the streams on which their works are situated, but of course much depends upon the efficiency of the means employed to effect this object. We may say, once for all, that the process of simple filtration of paper mill refuse is a delusion and a blind. No act of simple filtration such as we have heard has at times been attempted will suffice to purify to any appreciable extent the effluent from a paper mill, and why? Simply because most of the polluting matter is in a state of solution, and will of course find its way through any

, but shall be liable to pay costs of prosecutor, ss he has given him notice that he will rely on above defence.

PROCEEDINGS.

and 10. In any prosecution—
endant, and his wife or her husband, as the case be, may, if the defendant thinks fit, be called as nesses.
e case of imported goods, evidence of the port hipment is *prima facie* evidence of the place or ntry of production.

11.—An accessory under this Act is equally rincipal.

12.—(1) Upon information of an offence against justice may issue a warrant to have houses and arched.
owner of any goods or things which, if the of had been convicted, would be liable to for- not be found, an information or complaint may he purpose of enforcing such forfeiture, and after sement such goods will be forfeited.
goods or things forfeited under this section, or ther provision of this Act, may be destroyed or isposed of, and the court may, out of any pro- rd to any innocent party any loss he may have

VEXATIOUS INDICTMENTS ACT.

13. The Act to prevent vexatious indictments to any indictment under this Act, but not in

COSTS.

14. On any prosecution, the court may order paid by either party.

LIMIT OF TIME.

15. No prosecution can be instituted after three rom the commission of offence, or one year from ry thereof, whichever first happens.

IMPORTATION OF GOODS.

16. All goods which would be liable to for- er this Act are forbidden to be imported; and is on any goods a name which is identical with, rable imitation of, the name of a place in the ngdom, that name, unless accompanied by the e country in which such place is situate, shall be he purposes of this section as if it were the name n the United Kingdom.

WARRANTY.

17. On the sale of any goods to which a mark scription has been applied, the vendor shall be warrant that the mark is a genuine one, unless a writing not to be so.

EXEMPTIONS.

18. Where a trade description is lawfully and pplied to goods of a particular class, or manu- a particular method, to indicate the particular thod of manufacture of such goods, the provisions with respect to false trade descriptions shall not ch trade descriptions when so applied: provided such trade description includes the name of a place and is calculated to mislead as to the place or ere the goods to which it is applied were actually oduced, and the goods are not actually made or that place or country, this section shall not apply is added to the trade description, immediately fter the name of that place or country, in an spicuous manner, with that name, the name of the untry in which the goods were actually made or with a statement that they were made or produced

19. (1) No discovery or answer shall be ad- evidence against a person in any prosecution.
thing in this Act shall render liable any servant resident in the United Kingdom who *bonâ fide* dience to instructions.

OTHER FALSE REPRESENTATIONS.

Section 20. Any person who falsely represents that any goods are made by a person holding a royal warrant, or for the service of Her Majesty, or any of the royal family, or any Government department, is liable, on summary conviction, to penalties up to £20.

SCOTLAND AND IRELAND.

Sections 21 and 22 contain certain modifications necessary to make the Act apply to Scotland and Ireland respectively.

REPEAL.

Section 23. The Merchandise Marks Act, 1862, is repealed.

Correspondence.

TECHNICAL EDUCATION.

To the Editor of the Chemical Trade Journal.

Sir,—I should be glad if you would allow me to make a few remarks upon Mr. Watson Smith's address at New Mills, as reported in your issue of October 29th. As regards the soundness of his strictures upon the inferiority of the material turned out by the present system of technical education there can hardly be two opinions, nor am I disposed to question the justice of the blame that he candidly attaches to his own order; but I venture to think the cause of these unsatisfactory results lies deeper than he realises, and is mainly due to the way in which we, as a nation, have allowed this so-called technical education to run away with us, and have become, as it were, technical education mad. In plain English, have we not made a mistake with our quantities? Are we not attempting to turn out articles by the gross where there is only a market for the score? How many thousands of young men, throughout the length and breadth of the country, now availing themselves of the innumerable advantages (?) begotten by this universal craze, are buoying themselves up with the idea that the chaotic smattering they are trying to digest will enable them to realise competence or position; and how many tens or hundreds will escape the practical application of the lesson that even in the realms of applied science the hewers of wood and the drawers of water must be in the majority, and the hands of the many must be controlled by the brains of the few? That, in point of fact, if all the chemical students of to-day become Bunsens and Wöhlers in their profession, and even excel Solomon himself in general cuteness, even then 90 per cent. must be content to wash bottles for their more fortunate brethren, or step down from the pedestal of science altogether and embrace other (and it is to be hoped more lucrative) callings. Then, again, is it not a matter of common observation that as an actual earner of money—and this "earning and acquiring money" is the main point at issue—the man of the highest scientific attainments is rarely to the front? True, we have a few examples of investigators who have received in hard cash the fruits of their labours, but would it not be far easier to multiply instances where devotion to science has been its own and only reward? Would it not appear that scientific men are apt to undervalue that general tact and shrewdness which necessarily accompany the knowledge that is to be synonymous with power? In conclusion, let me enter my feeble protest against the undue exaltation of things German to the prejudice of things English that runs all through this address. If we are really losing caste in the commercial and manufacturing world, may it not be very largely due to the excited and enthusiastic manner in which certain of our scientific men make use of their high position to champion the cause of other countries against their own? Is not keen competition, with its accompanying reduced margin of profit, an inevitable consequence of the spread of knowledge and the development of communication—of the irresistible tendency to break down the barriers of space and sweep away the distinctions of nationality? But surely, for the present, we may not unreasonably wish that our professors and other public men would subordinate the oracle to the patriot, and not be continually advising John Bull's intending customers to go elsewhere to be supplied.

DUBIOUS.

phate of alumina and of alum, some very perfect crystals of alum of exceedingly large size being one corner of the case. Spence's International is shown as an instrument capable of measuring of substances in solution in liquids, and also the vity of solutions; we may say, however, that we many years preferred the direct specific gravity ever having found any method equal to it, and if makers would only graduate hydrometers in a nner we feel sure the direct system would be much sively used.

(To be continued.)

Trade Notes.

VERPOOL UNDERTAKING.—The African Indigo ng Company's Line has just been registered at House by A. Parker, 6, Old Serjeant's Inn, Lon- capital of £100,000 in shares of £5 each. The the Company is to trade with, grow, produce, hase, and sell all varieties of plants and crops from go can be obtained; to manufacture indigo from es of supply, and generally to do all things con- he development of indigo production and trading. bscribers are:—Geo. C. Dobell, City Buildings; ané, 26, Oldhall-street; John Berey Parry (Charles Co.), 51, South John-street; Louis Solomon rt and Co.), 17, Irwell Chambers; Arthur D. F. 4n, Liverpool and London Chambers; C. Gosten- Liverpool and London Chambers; and W. D. Redcross-street. The first directors will be chosen ve signatories to the memorandum of association. ors shall not at any time be more than seven, and, the case of the first directors, none but members he time being hold and shall for six months con- have held in their own right 100 shares each, be shares issued as fully paid, shall be eligible for The remuneration of the managing director shall to time be fixed by the directors.

LPHA OIL COMPANY.—A cable despatch from ia states that the Alpha Oil Company, a young e Standard Oil Monopoly, has failed. Its capital ,000.

IC LIGHTING.—The *Times* Brussels correspondent neral use of electric lighting has made a great step The General Company of Electricity of Berlin, with l-up capital of £250,000, has issued £350,000 of shares at a rate of 122 for 100. £40,000 worth beforehand by MM. Siemens and Halske, and the cribed for several times over, all fully paid. The the working of central electricity in Germany and tries.

OF THE YORKSHIRE JUBILEE EXHIBITION.— ition, opened at Saltaire on May 6th by Princess the Queen's command, closed on Saturday, Oct. e total attendance has reached 823,133. It is yet o speak as to the financial result of the exhibition, l be some time before it will be certainly known not there will be any funds out of it to defray the Art and Science Schools, built in memory of the tus Salt. It may be said that such a measure of s not attended the venture as the promoters hoped r that, amongst other causes, the gigantic attrac- anchester and other places of a similar character e degree account.

OPS IN MANITOBA.—Complete returns were issued day, the 2nd instant. The average yield of wheat a is $20\frac{7}{8}$ bushels to the acre, against $15\frac{1}{2}$ bushels (United States), and $12\frac{7}{8}$ in Minnesota. The in Manitoba is estimated thus:—Wheat, 12,400,000 arley, 1,900,000; and potatoes, 2,650,000 bushels. ate does not include the province of Assinboia, average yield was:—Wheat, 23 bushels; oats, 39 and barley, 32 bushels per acre.

THE HAMMOND ELECTRIC LIGHT COMPANY.—At an extraordinary meeting of this Company on Thursday, the 27th ult., held to receive the report of the liquidator, it was stated that the creditors had been paid in full, and a return of three shillings per share was ordered to be made to the shareholders.

EXPLOSION IN A LEAD MINE.—An explosion, by which five men were killed, occurred at an early hour on Thursday, November 3rd, in the Mill Close Lead Mine, near to the village of Darley Bridge, in Derbyshire. The explosion, which was caused by the firing of a shot, loosened several tons of rock, under which the men were buried. One man who was standing with the others when the disaster occurred escaped with a few cuts.

EXPERIMENTS WITH ELECTRICITY AT BLACKPOOL.—There was a large gathering at Blackpool on Friday, the 28th ult. of gentlemen interested in the application of electricity to the lighting of large areas and the propulsion of the tramcar, and a series of interesting experiments were conducted. The promenade and piers were illuminated by electricity, about eight different systems of lighting being exhibited; and the tramcars, which are propelled by electricity along the promenade, were also brilliantly lighted by the same agency.

YORKSHIRE MINERS' ASSOCIATION AND THE OUTPUT.—The question of the restriction of the output of coal suggested by the national conference of miners a week or two ago, at Edinburgh, has been considered by the Executive Committee of the Yorkshire Miners' Association. The proposals were that the restriction should be national, and that the opinion of each mining district should be taken on the question before it was attempted to put into force the suggested restriction. The Yorkshire Miners' Association are now issuing circulars to their lodges, and also to all the collieries in the county where no branch of the association exists, requesting them to send delegates to a conference, to be held at Barnsley on the 14th inst., to consider the question, and to decide on the report which shall be presented from Yorkshire to the adjourned National Conference, which will take place at Newcastle on the 18th inst. The desire, so far as Yorkshire is concerned, is that every pitstead shall have full opportunity of expressing the opinions of the men employed therein, so that there can be no mistake about the decision of Yorkshire on the question.

THE INDIAN PETROLEUM FIELDS.—According to latest advices, Mr. Townsend, the petroleum expert in charge of the Government oil wells at Kattan, in Beloochistan, fifty miles from Sibix, will begin in a few days the deep borings recently decided upon. The commencement of the work has been delayed by the drought, which has prevailed in that part of the country; but the machinery is now in place, and the deep borings will not be much longer delayed. The indications already obtained by moderate borings show that at a depth of 2,500ft. an annual yield of 50,000 barrels can be obtained when once the live oil has been reached.

EXPLOSION AT A CLUB: FOUR MEN INJURED.—At about three o'clock on Wednesday afternoon, Nov. 2nd, an explosion of gas occurred at the Carlton Club, London, causing for the moment much consternation in the neighbourhood. For some weeks past the club has been closed for repairs, and it was re-opened to members only a day or two ago. Yesterday some workmen in the employ of Messrs. Taylor and Tucker, contractors, were engaged in the basement, excavating for a new wine cellar, when an escape of gas was discovered. One of the workmen, who had a lighted candle, went towards the place where the gas was escaping, and a loud explosion immediately occurred. There were four persons in the cellar at the time—three workmen and Mr. Bohannon, the wine butler—all of whom were knocked down and sustained injuries, though not of a serious nature. The butler received a slight cut on the head, and was attended to in the club. The three workmen were taken to the Charing Cross Hospital, and their injuries having been attended to they were able to go home. At the club the damage was limited to the breaking of a few panes of glass and the falling of part of a wall. Very few members were in the club at the time.

[illegible] the current so that the [illegible] being still commonly [illegible] are now in common [illegible] the ventilating power [illegible] and during [illegible] had to a great [illegible] surplus ventilation [illegible] inappreciable. [illegible] show the change of [illegible] expansion of gas, and [illegible] that increased issues [illegible] the commencement of [illegible] afterwards, which ren- [illegible] "colliery warnings"

[illegible] SCOTLAND CHEMICALS.

[illegible] TUESDAY MORNING.

[illegible] slightly increased [illegible] there is really no [illegible] over the general [illegible] continues to rise, and [illegible] paraffin scale, for re- [illegible] in the direction of an [illegible] most of the others have [illegible] powder appears [illegible] and although £8 is [illegible] less. Caustic soda [illegible] and bicarbonate of [illegible] has given way 5s. [illegible] shilling or two down, [illegible] with very little of [illegible] chemicals continue unas- [illegible] are still easily procured. [illegible] one of an alleged reso- [illegible] of petroleum for the [illegible] price combination [illegible] consumers of paraffin [illegible] Bichromates are [illegible] any improved demand [illegible] the manufacture needs [illegible] of soda section. General [illegible] 46s. net Tyne; alum, [illegible] English refined, £31, and [illegible] 48 52° 1d., less [illegible] £[illegible] 5s., 70 72 £7. 6s. 3d., [illegible] 2½ Liverpool; bicar- [illegible] £5. 15s., and 1 cwt. casks, [illegible] 48 45 1⅛d., less 5 [illegible] Tyne; [illegible] bleaching powder, £8, f.o.r. [illegible] 4½d., and of soda 3½d., [illegible] English respectively; nitrate [illegible] of potash, 6d., less 5 [illegible] £10. 17s. 6d. to £11, f.o.b. Leith; [illegible] 2½ [illegible] 2⅛d.; paraffin wax, 3d.; [illegible] of copper, £15, less 5 [illegible] Liver- [illegible] include 1,138 tons pyrites of [illegible] and 581 barrels of oil.

THE LIVERPOOL CHEMICAL MARKET.

[illegible] rather dull, and ¾d. up. Caustic soda: [illegible] 10s.; 60 [illegible] cream, £6. 7s. 6d., and 70 [illegible] Bicarbonate, £6. 10s. Nitrate of soda [illegible] at 9s. to 9s. 6d. Soda crystals, £2. 15s. [illegible] brown lump, £6. 15s.; green lump, [illegible] 100°, £4. 17s. 6d., and 75°, £3. 12s. 6d. [illegible] powder: £8 for hardwood, and £7. 10s. for soft- [illegible] Saltcake, 21s. 6d. Bichromate of potash, 4¾d. [illegible] of soda, 3½d. Carbonate of potash, £20. [illegible] of potash, 6⅛d. Chlorate of baryta, 1s. to 1s. 4d. Nitrate of baryta, 26s. Chloride of barium, £9. Hydrate of barium, 12s. Dioxide of barium, 8½d. per lb. Arsenic, £10. 15s. to £11.; lump is not offering. Saltpetre: crystals,

nd, 26s. Sulphur: roll, £6. 15s.; flour, £9. 5s; s, £4. 10s. Sulphate of copper, £14. 15s. Blanc 10s. Manganese: Sulphate, £21; borate, best nake, 6d. Hydrate of alumina, £24. 10s. Preci- rbonate of magnesia, 50s. Chloride of magnesium c) at 45s. Chloride of calcium, 50s. Epsom salts, 5s. Muriate of ammonia: white, 32s.; grey, 31s. orax, £24 to £26. Verdigris, 1s. per lb. Acetate £12. 5s. Bisulphide of carbon, £15. Chloride of 7d. to 8d. per lb. Liquid ammonia, ·880, 3¾d.; 3½d. Montreal potashes, 24s. Chloride of zinc 18.

THE ALKALI TRADE.

ASH and caustic soda are both dull, and consumers ng forward to lower prices, some having informed ey see no good in buying forward when such low austic over all next year are being made. Bleaching ontinues firm for present delivery, and much business has been done, covering all next year, at prices low to-day's quotations. Saltcake is still a drug, esponds to the pitch of the tar trade; there is at o outlet for the quantity produced, and it lies in ting for someone to find out a new use for it. Soda re finding a serious competitor in "crystal car- and we notice also that large quantities of this are now finding their way to New York.

MISCELLANEOUS CHEMICAL MARKET.

has been some indication of improvement in busi- rally during the past week. Prices upon the whole y, but there is an increased inquiry for spot and deliveries, and a fair amount of business passing ufacturers' hands. Sulphate of copper has still dvanced, and £16 per ton is now about present inc, lead, and tin products are firm in prices. Tin re dearer: 8d. to 9d. per lb. now being asked. products are in good demand: crystal carbolic No. at 1s. 1½d. in quantity; picric acid, at 1s. 5d. per ent naphtha, brisk, at 1s. 3d. to 1s. 4d. per gallon. both for prompt and forward, are moving slowly, s are steady. Acetates of lime, brown and grey, delivery, have been sold at £9. 12s. 6d. and ., and for 1888 delivery, higher figures are quoted. gar of lead still scarce and firm, £19. 10s.; foreign gar of lead slightly lower, £26. 15s. Acetate of s. per ton. Caustic soda and soda-ash are quiet, tly lower in price. Potash, caustic and carbonate, nged. Sulphocyanides are rather lower.

THE TAR PRODUCTS MARKET.

rophecy respecting the future of benzol does not have deterred the proprietors from moving the car- plant from Milton and Manchester to Talk-o'th'-Hill . The Manchester works are, to a large extent, d, and the time is rapidly approaching when the be working on new ground.

nzol market is reported a shade firmer; and, though ot be said to have increased, 2s. 4d. may be to-day's price for 50/90. Moreover, a very large has just been effected, covering all next year at for 50/90, so that producers may now take to-day's h the new year's price, and read the conundrum for s. Solvent naphtha is in great request, at 1s. 2d. at 150° C., and the possibility that they will have re is tempting users to inquire for forward delivery. is firm, very firm; principally on account of the ntity now used for the "Lucigen" and other lights, and makers are asking and receiving 1½d. at their works. Carbolic acid is reported weaker, hould not be *surprised to see it drop at* any moment from its present position. Anthracene is still firm, and the value to-day may be quoted as 1s. 3d. for A quality, and 11d. for B, though many makers ask 11½d. per unit for 30 %. Pitch goes from bad to worse, and what is going to be done with the accumulated stocks at present existing in this country, especially in London, is more than we can tell. At Runcorn 11s. seems to be the nominal value if sales could be made, and we have heard of transactions at 12s. f.o.b. London. In certain quarters coal has dropped so much in value that pitch fuel has been abandoned, and whether it will ever be employed again by those who have discarded its use is a matter open to doubt. There are situations where tar distillers are receiving less than fuel price for their pitch: Are there not amongst them men ingenious enough to turn it to some other use?

THE SULPHATE OF AMMONIA MARKET.

AFTER having steadily fallen for the past month, sulphate is a shade firmer—not only nominally, but in actual value. In spite of the tactics of speculators, sulphate has been sold during the past few days at £11. 7s. 6d. f.o.b. Hull, and the market is correspondingly firmer at all other ports. Beckton sulphate is still quoted at £11. 15s., but business has been done in London outside makes at £11. 7s. 6d. Leith is quoted at £11. 1s. 3d. to £11. 2s. 6d., and Liverpool at same figure.

There is no denying the fact that sulphate is not over plentiful, and, if things keep going as they are, the spring demand will assuredly bring about an increase in price.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

14704. F. H. DANCHELL. For a new or improved manufacture of manure. October 28.

14706. J. NICHOLAS and H. H. FANSHAWE. For an improved mode of, and apparatus for, the carbonisation, calcination, and decomposition of organic and inorganic matter. October 28.

14982. F. A. HILLÉ. For improvements in treating sewage, and in liquid disinfectants used for that purpose. November 3.

14996. J. HANSON. For the treatment of alkali waste for use in the purification and deodorisation of sewage and impure waters or matters. November 3.

COMPLETE SPECIFICATIONS ACCEPTED.

17083. J. Y. JOHNSON. A communication from Farbenfabriken vormals, F. Bayer and Co., of Germany. For improvements in the manufacture of azo dyes. December 30, 1886.

4. R. TERVET. For improvements in apparatus for treating or purifying paraffin wax. January 1, 1887.

165. C. D. ABEL. A communication from Messrs. Pfeifer and Langen, of Germany. For method of extracting foreign substances, in particular raffinoes, from sugar solutions, by means of lead, either in the form of oxide or as electrode. January 5, 1887.

1893. W. HICKS. For improvements in the manufacture of lubricating grease. February 7, 1887.

11658. E. EDWARDS. A communication from R. Sjöberg, of Sweden. For improvements in explosives. August 27, 1887.

12486. O. M. THOWLISS. For improvements relating to the production of sodium and potassium, and to apparatus therefor. September 14, 1887.

12632. J. C. LYMAN. A communication from J. H. Lyman, of United States. For improvements in waterproof compositions or paints. September 17, 1887.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

	£	s.	d.
ACIDS:—			
,, Acetic, 25 °/₀ ... ... per cwt.	0	10	3
,, ,, Glacial ... ... per lb.	0	0	6⅞
,, Arsenic... ... ... per cwt.	0	12	9
,, Chromic 75 °/₀ ... ... per lb.	0	0	4
,, Fluoric ... ... ,,	0	0	5
,, Muriatic (Tower salts) 30° Tw., per bottle	0	0	6
,, ,, (cylinder) 30° Tw. ... ,,	0	2	9
,, Nitric, 80° Tw. ... ... per lb.	0	0	2¾
,, Nitrous... ... ... ,,	0	0	2¼
,, Oxalic ... ... ,,	0	0	4
,, Sulphuric (fuming 40 °/₀) ... ... per ton	12	0	0
,, ,, (Brimstone 168°) ... ,,	4	5	0
,, ,, (Pyrites 168°) ... ... ,,	3	7	6
,, ,, (spent oxide 168°) ... ,,	3	17	6
,, ,, (,, 150°) ... ,,	2	5	0
,, ,, (Pyrites 150°) ... ... ,,	1	15	0
,, Tartaric ... ... per lb.	0	1	6½
Arsenic, white powdered ... ... per ton	10	12	6
Alum... ... ... ,,	4	15	0
Ammonia, ·880 = 28° ... ... per lb.	0	0	3¼
,, = 24° ... ... ,,	0	0	1¾
,, Carbonate ... ... ,,	0	0	3½
,, Muriate ... ... per ton	22	0	0
,, ,, (sal-ammoniac) ... per cwt.	34/- & 32/-		
,, Sulphate (grey), London ... per ton	11	7	6
,, ,, (grey), Hull ... ... ,,	11	7	6
Aniline Oil ... ... per lb.	0	0	9½
,, Salt ... ... ,,	0	0	8
Antimony... ... ... per ton	33	10	0
,, (tartar emetic) ... ... per lb.	0	1	0
Barium Chloride ... ... per ton	7	10	0
,, Carbonate (native) ... ... ,,	4	10	0
,, Sulphate (native levigated) ... ,,	3	5	0
Bleaching Powder, 35 °/₀ ... ... ,,	7	12	6
,, Liquor, 7 °/₀ ... ... ,,	2	12	6
Bisulphide of Carbon ... ... ,,	12	5	0
COAL-TAR DYES:—			
Alizarine (artificial) 20% ... ... per lb.	0	0	9
Magenta ... ... ,,	0	3	9
COAL-TAR PRODUCTS:—			
Anthracene, 30 °/₀ f.o.b. London, per unit per cwt	0	1	3
Benzol, 90 °/₀ ,, ... per gallon	0	2	9
,, 50 °/₀ ,, ... ,,	0	2	4
Carbolic Acid (crystallised 35°) ... per lb.	0	1	1½
,, (crude 60°) ... ... per gallon	0	3	10½
Creosote (ordinary)... ... ... ,,	0	0	1¼
,, (filtered for Lucigen light) ,,	0	0	2¼
Crude Naphtha, 30 °/₀ @ 120° C. ,,	0	0	11
Grease Oils, 22° Tw. ... ... per ton	1	10	0
Pitch, f.o.b. Liverpool or Garston ... ,,	0	11	0
Coke-oven Oils (crude) ... ... per gallon	0	0	1½
,, (distilled) ... ... ,,	0	0	2
Copper (Chili bars) ... ... per ton	46	10	0
,, Sulphate ... ... ,,	16	0	0
,, Oxide (copper scales) ... ... ,,	40	0	0
Glue ... ... per cwt.	1	15	0
Glycerine (crude) ... ... per ton	33	0	0
,, (refined) ... ... ,,	55	0	0
Iron (turnings)... ... ... ,,	1	13	0
,, Peroxide (blue billy) ... ... ,,	0	7	0
,, ,, (bog ochre) ... ... ,,	1	13	0
,, ,, (precipitated ... ... ,,	3	0	0
,, Sulphate (copperas) ... ... ,,	1	2	6
,, Sulphide (antimony slag) ... ... ,,	1	0	0
Lead (sheet) for cash ... ... ,,	13	15	0
,, Acetate (white) ... ... ,,	26	15	0
,, ,, (brown ... ... ,,	19	10	0
,, *Nitrate* ... ... ,,	22	10	0

	£	s.	d.
Lime, Acetate (brown) ... ... per ton	9	15	[illegible]
,, ,, (grey) ... ... ,,	13	10	[illegible]
Magnesium (ribbon and wire) ... ... per oz.	0	2	[illegible]
,, Chloride ... . per ton	2	7	[illegible]
,, Carbonate .. .. per cwt.	1	17	[illegible]
,, Hydrate ... ... ,,	0	10	[illegible]
,, Sulphate (Epsom Salts) ... per ton	2	10	[illegible]
Manganese Sulphate ... . ,,	19	10	[illegible]
,, Borate .. .. per cwt.	2	5	[illegible]
,, Ore, 70 °/₀ ... ... per ton	2	10	[illegible]
Methylated Spirit, 60° O.P. ... ... per gallon	0	2	[illegible]
Naphtha (Wood), Solvent ... ... ,,	0	4	[illegible]
,, ,, Miscible, 60° O.P. ... ,,	0	5	[illegible]
OILS:—Castor ... ... per cwt.	1	4	[illegible]
Cotton-seed ... ... per ton	19	10	[illegible]
Linseed ... ... ,,	18	15	[illegible]
Lubricating, Scotch, 885°—890° ... ,,	6	10	[illegible]
Petroleum, Russian ... ... per gallon	0	0	[illegible]
,, American ... ... ,,	0	0	[illegible]
Silver (metal) ... ... per oz.	0	3	7½
,, Nitrate ... ... ,,	0	2	[illegible]
STARCHES:—			
Sago ... ... per cwt.	0	8	[illegible]
Potato (farina) ... ... ,,	0	10	[illegible]
Sodium (metal) ... ... per lb.	0	6	[illegible]
,, Carb. (refined Soda-ash) 48 °/₀ per ton	5	0	[illegible]
,, ,, (Caustic Soda-ash) 48 °/₀ ,,	3	17	[illegible]
,, ,, (Carb. Soda-ash) 48 °/₀ ,,	4	0	[illegible]
,, ,, (Soda Crystals) ... ... ,,	2	10	[illegible]
,, ,, (Crystal Carbonate) ... ,,	5	6	[illegible]
,, Chlorate ... ... per lb.	0	0	[illegible]
,, Borate (Borax) ... ... per cwt.	1	9	[illegible]
,, Bichromate... ... ... per lb.	0	0	[illegible]
,, Hydrate (74 °/₀ Caustic Soda)... per ton	8	2	[illegible]
,, ,, (70 °/₀ Caustic Soda)... ,,	7	2	[illegible]
,, ,, (60 °/₀ Caustic Soda, white) ,,	6	2	[illegible]
,, ,, (60 °/₀ Caustic Soda, cream) ,,	6	0	[illegible]
,, Bicarbonate ... ... ,,	5	17	[illegible]
,, Hyposulphite ... ... ,,	5	5	[illegible]
,, Nitrate (95 °/₀) ex ship Liverpool per cwt.	0	8	10½
,, Silicate (glass) ... ... per ton	5	10	[illegible]
,, ,, (liquid, 100° Tw.)... ... ,,	4	7	[illegible]
,, Sulphate (Salt-cake)... ... ... ,,	1	1	[illegible]
,, ,, (Glauber's Salts) ... ,,	1	17	[illegible]
,, Sulphite ... ... ,,	5	12	[illegible]
Potassium (metal) ... ... per oz.	0	3	[illegible]
,, Bichromate ... ... per lb.	0	0	[illegible]
,, Carbonate, 90% ... ... per cwt.	0	18	[illegible]
,, Chlorate ... ... per lb.	0	0	6½
,, Hydrate (Caustic Potash) ... per ton	22	0	[illegible]
,, Nitrate (refined) ... ... per cwt.	1	2	[illegible]
,, Prussiate Yellow ... ... per lb.	0	0	[illegible]
,, Sulphate, 90 °/₀ ... ... per ton	9	15	[illegible]
,, Muriate, 80 °/₀ ... ... ,,	8	10	[illegible]
Strontium Hydrate, 98 °/₀ ... ... ,,	7	0	[illegible]
Sugar, Beet ... ... per cwt.	0	13	[illegible]
,, Cane ... ... ,,	0	18	[illegible]
Sulphocyanide of Barium ... ... per lb.	0	0	[illegible]
,, Ammonium ... ... ,,	0	0	[illegible]
Sulphur (Flowers) ... ... per ton	9	5	[illegible]
,, (Roll Brimstone) ... ... ,,	5	15	[illegible]
Superphosphate of Lime (28 °/₀) ... ... ,,	2	0	[illegible]
Tallow ... ... ,,	23	10	[illegible]
Tin (metal) ... ... ,,	132	0	[illegible]
,, Crystals ... ... per lb.	0	0	[illegible]
Zinc (Spelter) ... ... per ton	16	15	0
,, Chloride (solution 96° Tw.) ... ... ,,	5	15	0

e Chemical Trade Journal,
ATURDAY, NOVEMBER 19, 1887.

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TO ADVERTISERS.

CIAL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

ıe first week of the approaching New Year we shall **SPECIAL NUMBER** of the **Journal.** We pro- bring our first volume to a close with the last Saturday ember, 1887. The issue of January 7th, 1888 (No. 33), mmence Volume II. It will be an enlarged special r of very general interest. We shall issue along with **ltle-page** and **Index** for the first volume, together neat and useful **Office Almanac,** suitable for our bers, which is now in course of preparation.

ıding our regular subscribers, our New Year's Number issued to **NOT LESS THAN 10,000 FIRMS AND IDUALS,** so that intending advertisers will see at hat this issue is worthy of their special attention.

may explain that in our Publishing Department, we very carefully compiled lists—in most cases the result ial knowledge and information at our command—of rm of repute, both at home and in the main trading abroad, connected with the various industries whose s it is our province to serve. We utilise these lists y week, by selecting a number of them in turn, and sending out free copies of the Journal to those firms who have not yet become annual subscribers. The result is that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of the New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO,** numbering altogether, as we have stated, not less than **10,000** names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

WARMED, BUT POISONED.

In our issue of the 22nd ultimo we had occasion to chronicle what might have been a very serious disaster. On the Sunday morning, at Oldbury parish church, by some means or another carbonic acid or carbonic oxide, possibly both, found their way into the church by means of the air channel supplying warm air, and so quickly affected the school children that they fell from their seats during the service, creating great consternation and alarm. That the poisonous gas was really carbonic acid we have little doubt, as it occupied a stratum near the floor, and so the younger members of the congregation were alone affected, and a cat which happened to be in church was brought out dead; but there can be but little doubt that the carbonic acid was also accompanied by the lower oxide of carbon.

This week we have also to record a similar mishap at a chapel at Farsley, near Leeds, and the results seem to have been even more serious than was the case at Oldbury.

The question naturally arises, Who is responsible for such occurrences as these? for to our mind it is no excuse to say that the draught was the wrong way, and on that account the mephitic air entered the chapel. Our readers may perhaps think that such a subject as this is scarcely a chemical one; but as the combustion of fuel for chemical purposes is certainly within the scope of this journal, we feel also that its application to purposes of warming and ventilation is also one which may claim its fair share of attention, especially as architects and heating engineers as they venture to call themselves, will persist in introducing into public places contrivances which do not warm but poison. In putting down a heating apparatus, every care should be taken that its construction is such that, in the event of anything going wrong, the products of combustion cannot by any possibility enter the air channel.

We have brought this matter forward mainly on account of the fact that coke is reported to have been the fuel employed, and as we know that coke, as a fuel for domestic purposes, is looked upon in many quarters with a certain amount of disfavour, we consider that the blame should not rest upon the coke without a word being said as to the actual cause of the occurrence. Coke is as safe a fuel as any other kind when properly used, but as we may see from these two incidents, a smokeless fuel is not an unmixed blessing. When "the draught is the wrong way," to use a very popular expression, with a coal fire, the fact is soon rendered patent by the appearance of smoke, and every care is immediately taken to send it the right way; but with coke almost the only evidence is the sulphurous smell pervading the air of the apartment or building, and so long as people retain notion that there must be some sort of smell of t' whenever coke is used as a fuel, we are afraid always be liable to such accidents as we have herein

Suffice it to say that a coke fire, whether it be in a fireplace or in the heating apparatus of a large public ing, should not cause any odour, and if there is an

either the apparatus is so constituted as to be totally unfit for ordinary use or the air supply is a factor which has been neglected. We have quite recently had ample experience of the absolute incapacity of ordinary church attendants to deal with such matters as these; they imagine that to warm a large public building it is only necessary to fire away at the stove as hard as may be a few hours before the congregation appears at the doors; to shut up all the doors and windows as tightly as possible, and leave the apparatus to take care of itself. For a long time we have been of opinion that more colds and other ailments have been disseminated by means of meetings in public buildings than we would care to admit, and now to an already long list we must add the operation of public asphyxiation.

PROPOSED REMOVAL OF THE DOWLAIS IRONWORKS.

A SECOND DRONFIELD.

THE great iron and steel works of Dowlais, it is said, are to be removed to Cardiff, Lord Wimborne, the chief proprietor, having, it is stated, secured a large tract of land in the vicinity of the Tharsis Copper Works, on the East Moors, for that purpose. It appears that his lordship has been in communication with the Marquis of Bute for some time, with a view towards obtaining the necessary land, and as the negotiations have been brought to a successful issue, the initiatory steps of building furnaces and laying down other plant will at once be taken, as a preliminary to the removal of the works from Dowlais to Cardiff. The opportunity will be utilised for largely transforming the character of the undertaking, and the new steel works will be of the most advanced type. This transfer is one of the most important events which have occurred in the history of Cardiff, for by this means the Welsh metropolis is given a new industry. There are other ideas suggested by this immense removal. Swansea, with its varied industries, has always shone in comparison to Cardiff, which, so to speak, had only one arm, though that was a prodigious one. This huge addition to its coal industry will now give Cardiff the premier position in all respects, and open up a field for greater efforts than have ever yet been attempted. We may point to one more in addition to those suggested—steel shipbuilding. With the material close at hand, this will certainly follow, another industry of the greatest importance to our coal-owners be established, and shipbuilding, repairing docks, and other establishments arise that shall vie with any on the Tees, the Clyde, or the Tyne. But, in addition to the immense iron and steel works of Dowlais, with its 5,000 employés, there will be created in Cardiff a number of small but important industries which have not been fostered in Merthyr or Dowlais, but which receive a greater incentive from the facilities which Cardiff has to offer for their successful growth. The cross ends and waste cuttings of steel can be largely utilised in this way. Dowlais Works has grown with the years, and as Bessemer and Siemens entered upon their remarkable career, by which the iron manufacture gave way to the making of steel, Dowlais was subject to adaptation, by which the old plant was made to do duty as far as it could be made, and additions and extensions of the machinery were carried out. This led to the disuse of a good deal of the old plant; but, though Dowlais has kept itself in a capital position, and produces steel of the best kind, it is evident to the most superficial thinker that a new works of the latest type will be in a better position still in this competitive age. Take Cyfarthfa, for instance, where it is well known that steel can be produced at a cheaper rate than at Dowlais. And not this. The day of Welsh ore has gone by. Its per- 23 to 25 per cent. as compared with the 50 per- Spanish ore has put it out of the market. Hence that the placing of works on the seaboard, by railway rate will be saved, will alone form an item of profit. Nor does this form the only con- 2s. per ton can be saved by the works being free from any railway rate on ore, an additional 2s will be saved from the carriage of the manufactured the seaboard. Against this the carriage of coal and form but a small item, especially as the coal at the c and collieries is working out, and literally "going valley to Cardiff."

In Dowlais itself the news has caused a perf Almost the entire population of the town, which about 36,000, is dependent upon the works. In yesterday the statement was discredited.

THE EVAPORATION OF WASTE LIQUI

IT is surprising how modern science has kept the requirements of the Arts and Manufactures: a w known soon sets thinking men at work, and inven improvements upon inventions spring up like mus the sylvan glade.

It is now just ten years since I read a paper befo those I see present to-night, at the rooms of the and Mechanical Society, out of which the Jo eventually sprung, upon the subject of the "Porion rator, a system which had just been introduced into for dealing with the liquid waste emanating from mills there. Since that time these evaporators steadily at work, and have kept many thousands organic and mineral refuse out of the rivers and wat which must have been of incalculable benefit not o riparian owners, but also to the inhabitants upon th

In Scotland, when the riparian owners first took prevent the fouling of their streams, means were firs prevent the introduction of the strong waste espart which were the main source of nuisance, and nothing for it but to evaporate them to dryness, a the residue. At first, owing to the crude and u nature of the evaporating apparatus only the stro could be treated: to do this the Arnott and Roeck rators answered fairly well, as the quantity dealt not excessively large. The Arnott evaporator cons furnace, with two beds behind the fireplace, each about ten feet square, the waste heat from whi between two pans placed at the end of these furn Both these pans were filled with liquor undergoing tion, the liquor coming from the grass boilers run into the upper pan, and from thence into the lowe waste heat from the furnaces playing over the surf liquor in this lower pan. By this utilisation of the weak liquid became partly concentrated before on the furnace beds, and we believe that a very fai tion was accomplished. Waste esparto liquor however a very large amount of organic matter, wh any rational system of evaporation should be mad completely, and yield up its heat of combustion for e purposes. In the Arnott system this was not the c partly burned gases entered immediately into the c between the two liquor pans, and their temper lowered immediately to a point at which combu rendered impossible. A fair number of Arnott e were erected; but when the demand for the evap weaker liquors came about, this system could no hold its own against all comers. There are severa Lancashire still working the old Arnott evaporator with the cheap fuel existing round about them, certain that the evaporation of the weak liquors, *i.* and second washings from the esparto boilers ca profitable operation, and consequently they are into the stream.

The want of an evaporator to deal with the weak produced the Roeckner system, which was a distinc upon the Arnott; and no doubt this evapora evaporate at a profit the original esparto liquor m the first wash from the boilers. More than this think it is capable of. There are several Roeckne

* A paper read by George E. Davis before the members o Club, Nov. 9th, 1887.

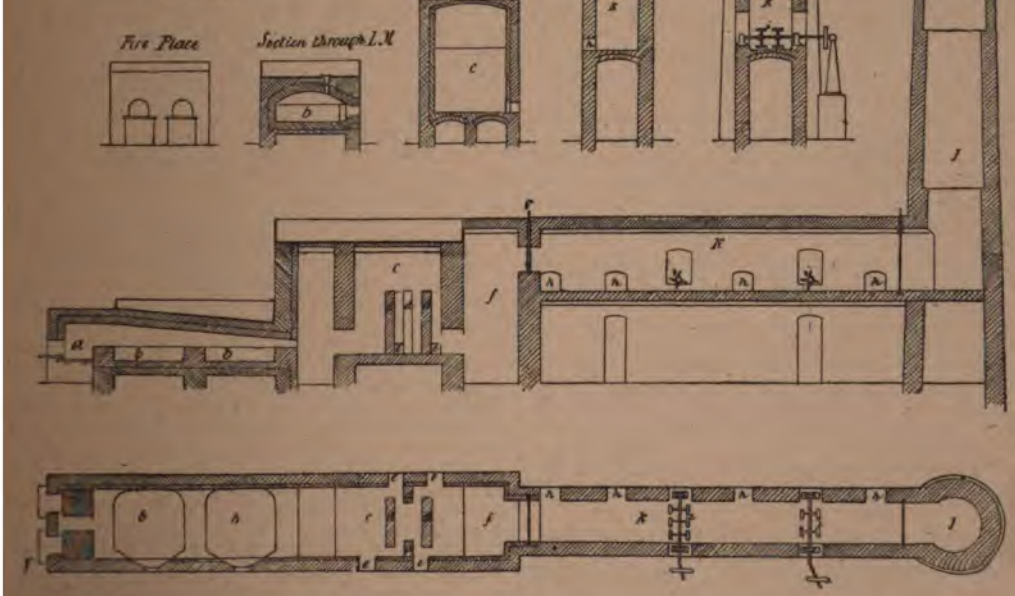
ck in England and Scotland, and the chief objection to n seems to be the heavy amount annually expended in in.

1876 the riparian owners in Scotland again made er demands, and this time that no esparto liquor of any should find its way into the river. The paper makers put upon their mettle, and a scheme for constructing a iron conduit running along the Esk bank into the sea actually set going. Science, however, came to their aid shape of the Porion evaporator, which has been found ble of evaporating twenty tons of waste esparto liquor very ton of coal expended as fuel. This arises from the already mentioned, that the esparto liquor itself contains h fuel matter if properly consumed. In evaporating rto liquor a certain amount of evaporation—the finish of e operation—has to be done in a furnace on account of viscid nature of the residue, and moreover it has to be ned in order to utilise the organic matter as fuel, and to are the soda for use over again. The whole of the rto liquors of a paper mill will not be of a strength ter than 6° Tw., and samples of all these liquors even sent wholesale into the stream in Lancashire might have seen in my case (No. 927) at the Manchester Royal ice Exhibition. There are a number of these "Porion" orators at work both in England and Scotland, and I of opinion that for lowness of prime cost, simplicity of gn, absence of repairs and ease of working, it will be a time before it is beaten, if ever it is beaten for the oration of esparto liquors. The accompanying illustra- will show the construction of the apparatus of the lest size at present constructed, *viz.*, to evaporate 5,000 ns per twenty-four hours.

e apparatus is complete in itself, from furnace to ney, and consists of the evaporator proper *K*, the com- on chamber *c*, the furnace beds *b b*, and the fireplace *a*. peration, the liquor of a gravity of 6° Tw. or 1,030 fic gravity, is run into the evaporating chamber *K* from the tank over the combustion chamber *c*, to which it is first ped from the boilers. The liquor enters the evaporating ber at the chimney end, and fills up the floor of the ber to a certain level, which is kept constant by means special kind of regulator fixed in the door *h*, close by the damper *g*. From here it flows by means of a wide shute into an iron pan, placed over the furnace arch at *b b*, from whence it is taken to feed the furnaces. The liquor runs into the evaporator boiling, and in passing through the chamber *K* is concentrated from 6° Tw. to about 50° Tw., to such a strength in fact, that were it not kept hot it would at once solidify, or at least become semi-solid. In the furnaces *b b* the evaporation is finished, and the organic matter is partly distilled and burned off, and the vapours mixed with excess of air pass into the combustion chamber *c*, where they are completely consumed and furnish heat, which passing the damper *g* enters the evaporating chamber *K*, and after producing evaporation escapes by the chimney *J* as one immense cloud of vapour. The two sets of centrifugal fanners placed in the chamber, dip about one-eighth of an inch into the liquor, and by their rapid revolution (about 300 revolutions per minute) keep the chamber filled with spray, through which the red-hot gases from the combustion chamber are forced to pass, entering the evaporating chamber at 700° or 800° F., and leaving at about 180° F.

With such a substance as esparto liquor, where so much heat is gained by the combustion of the organic matter, and where the tendency to thicken and so to choke up is so great, I cannot conceive any arrangement better than the one described. It has been mentioned more than once that with some better system of evaporation, the heat of the burning organic matter should suffice to evaporate all the water from a 7° Tw. solution. With complicated apparatus no doubt this could be done; but with crude esparto liquor is it worth the paper-makers' while to introduce a complicated machine when a simple one, not liable to get out of order, will recover all his soda and leave him a handsome profit? The chief merit of the "Porion" is its simplicity; the evaporating chamber *K* is not likely to get out of order and will last probably for twenty years, while the furnace end is the only portion of the apparatus at all liable to repair, and this must be the case with any system.

With esparto liquor I do not see much advantage in the use of a more complicated and at the same time more effective apparatus, seeing that it is not wise to concentrate the liquor beyond 50° Tw. before entry into the furnace, and only enough fuel is used in the fireplace to finish the evaporation



from this stage and to calcine the inorganic constituents. It is true that much heat escapes into the chimney by reason of the large quantity of heated vapours, for which an exit must be found; but if prime cost is no object, there is no reason why a large surface condenser should not be interposed between the evaporating chamber and the chimney, and use made both of the condensed water and of the heat thus given up.

In a paper mill where a "Porion" is at work evaporating about 30,000 gallons (about 150 tons) per twenty-four hours, and recovering 23 tons of 44 per cent. soda weekly, the fuel used (slack) amounts to 30 tons per week, three men being employed to work the apparatus on each shift. A ton of 44 per cent. recovered soda may therefore be said to cost:—

	£	s.	d.
Interest on capital 5 per cent.	£0	2s.	0d.
Depreciation at 10 per cent.	0	3	0
Repairs	0	2	0
Wages	0	8	0
Fuel at 6s. per ton	0	9	0
	£1	4	0

And as the selling price is at the present time about four guineas, there is every encouragement for the paper maker to keep this pollutant out of the rivers and watercourses.

If, however, a polluting liquid is so free from organic matter that the coal burned upon the firegrates has to be entirely depended on for causing evaporation, then it is a question whether even the Porion is the most economical system to be adopted; I think not, for very great strides have been taken during the past few years in connection with the system of multiple evaporation. By multiple evaporation I mean that system by means of which steam of high tension is made to boil successive quantities of the solution at graduated lower temperatures, by the employment of a partial vacuum applied to the surfaces of the liquors in the various vessels undergoing evaporation. We have not heard much of this system it is true, and the costly character of the apparatus has so far been against its introduction. Whether 20 or 30 tons of water be evaporated per ton of fuel is not in the case of soda recovery from esparto liquor of such moment as appears at first sight, amounting only to a few shillings per ton of recovered soda, a sum easily made up in expensive apparatus, repairs, and labour.

The system of evaporation by multiple effect has been known and worked on for many years, and I believe there is one paper mill in this country where it has been adopted for esparto liquors. In 1878, Jules Weibel, of Geneva, patented in this country "an apparatus for concentrating syrups of sugar, applicable also in other manufactures." In his specification he says: "In apparatus of double, treble, and in general multiple action employed in sugar refineries for the concentration of syrups, steam is introduced into the condenser of the first boiler, in which it condenses and causes the formation of an equivalent quantity of the vapour of water from the syrup to be concentrated. This vapour passes into the condenser of a second boiler, where it similarly gives rise to another quantity of vapour taken from the syrup, and so on.

These multiple evaporations can only take place when the liquors contained in the successive boilers can enter into ebullition at lower and lower temperatures. This result is obtained by producing a partial vacuum in the last boiler by means of a surface or injection condenser, supplied with cold water and provided with an air pump.

The limits between which the multiple action process can be worked are, the absolute vacuum as the lower limit which in practice can only be approached, and as the upper limit, the pressure which would render the apparatus too difficult to construct or too costly, and above all the temperature to which the syrup to be evaporated can be exposed without injury."

These words show us clearly that the principles governing ation by multiple action were well known prior to but the practical introduction of the system into did not take place until 1884, when Mr. Alfred Chapman began to supply plant for making distill from sea-water.

In his specification, Mr. Chapman states that his "is based and works upon the principle of the described in the Specification of Letters Patent g Jules Weibel, that is to say, evaporation by triple or effect is combined with evaporation by compression.

From a perusal of these specifications, it is easy t new patents can only be valid when based on new tions, so as to afford either plant with low prime cos economical working. The larger the number of " included in the plant the more water can be evapo ton of coal, but of course the cost of the plant incre the additional systems. Chapman works his first at a certain pressure above the atmosphere; and in h system" plant, the middle condenser shows 9lb. while the third is worked under a 14lb. vacuum. "triple system," it is quite possible, using steam above the atmosphere to effect an evaporation of tw pounds of water per pound of fuel, and with six systems very much more.

A good description of the practical application of tion by multiple effect may be found in Spon's Enc of the Industrial Arts, under the head of Sugar; in M Chemistry as applied to the Arts and Manufactu the head of Beet Sugar, and other treatises; and th have brought the subject before you to-night is in raise a discussion upon a subject which, though b understood by engineers, is certainly not well know manufacturers.

GAS-TAR AND ITS USES.

VIII.

During the past week we have had a very goo tion of the truth of our remarks in a previou respecting the employment of home-made burners fuel, not, it is true in this case for tar, but for t creosote oil. Messrs. Hamor Lockwood and Co distillers of Miles Platting, near Manchester, an Bradford, near the same city, have been burning with their Galloway boilers for some time past. In th at Miles Platting, a neat and well-ordered works wi tubes of the boiler are fired with creosote introduce by a well, but home-made steam-jet. The sy proved very effective, and Mr. Lockwood estimate steam raising in a double-flued boiler a ton of cre do as much work as two tons of ordinary boiler sla visited these works on Friday last, and found e satisfactory, not a particle of smoke issued from the during the period of our visit, and the man in char boilers seemed to have quite fallen in love with th We found the fire tubes had been lined with loose f for a distance of about six feet back, and that som holed brickwork had been introduced just outside o of combustion of the intense flame. What attr attention, was the small damper opening with w boiler was being worked. This, no doubt, in a grea conduces to the success of the system. We expr opinion that with a more carefully and better co steam-jet burner, considerably more favourable resu be obtained; whereupon Mr. Lockwood offered to the system at work at his second establishment at where creosote was being used with a "London burner,"—an invitation of which we eagerly availed On arrival at the Bradford works we found a very n structed apparatus in full swing, supplied with oil fro head tank, placed close to the boilers, and in this the plan seemed a favourite with the boiler man, w no clinkering to do and no ashes to wheel out." M wood informed us he would be pleased to show the any gas engineer who would like to see it in operat he added, "It's so simple, What is there to show?" one sees a successful apparatus at work we all are te exclaim, How simple! We are unmindful of t failures which have been made in bringing a thing li

aful issue. As we have already said on several s given filtered and well-screened tar there is no in dealing with it by any of the systems.

. Donaldson, of the Queenstown Gasworks, has some very interesting information with regard to etorts by means of tar. He says that six or seven , for want of a buyer he made use of tar as a fuel; offer was made by a distiller who erected a works Queenstown and Cork and paid twopence per its use as fuel was discontinued. However, after erent parties failing to conduct the business profit-ters came to a dead-lock, the works being closed and f tar stopped, so that he was forced to use it as fuel Mr. Donaldson says: "Our arrangement of retorts the winter while the tar furnace is in operation, is retorts in three arches, six in each, heated by one one tar furnace, nine to each furnace; the two eet in the middle arch, and thence in flues overhead. ither of the furnaces fail to do its duty twelve retorts affected, so that the tar furnace must be a success or too great. We lit up the tar fire near the end of er, 1886, and I was able to continue for 189 days, 830 gallons of tar, or 73 gallons per day. At our rice of coke, averaging 10s. 6d. per chaldron, makes rned value for 13¼d. per gallon; or to give it in orm:—

r produced		16,640 gallons.
ock on June 30th, 1885		7,180 ,,
ought from Cork Gas Co. at 1d.		1,900 ,,
		25,720
ld and used	8,499 gals.	
stock June 30th, 1886,	3,391 ,,	
		11,890
Used as fuel		13,830 gallons.

bonised 1,664 tons."

onaldson goes on to say "Whenever tar is used as quantity of coke for sale is greatly increased, and me special means are resorted to in order to sell this quantity at a fair price a large stock must accumu-in that case the manager will have to accept a ce to clear out. In my case for the whole of the onths 1,664 tons of coal produced 1,664 chaldrons out of which I sold the very large quantity of 1,396 , or 84 per cent. of the whole make, and bearing in summer months with only one furnace heating a ne retorts, the fuel account goes up to 40 per cent. e supposed that the fuel account of coke used as fuel tar and coke fires are at work together, which they six months, is very small, it is actually down to 5 the remainder of the coke being available for sale. account is 16·1 per cent. for the year, and only five tar furnace is at work making for the winter supply, about 70,000 cubic feet per day."

cret of burning tar successfully is the admission of r quantity of air, easily ascertained in one direction vation of the chimney top, as smoke will at once a paucity of air is being supplied.

(To be continued.)

WATER-GAS.

VII.

the appearance of our last article on this we have received several inquiries as to the of lighting up mills and small works with the lm burner. Suffice it to say, once for all, that the coal-gas flame is not sufficiently intense in heating produce any illuminating effect with the Fahnehjelm The gas employed must be water-gas; that is, gas passing steam through incandescent coke, and con-equal volumes of carbonic oxide and hydrogen. opinion is that the system should be favourably ito by all those millowners and other large con-gas who are at present paying over one shilling and sixpence per thousand cubic feet for ordinary coal-gas, as there can be no doubt but that the introduction of the system would lead to the saving of large sums of money. Moreover, by means of the same gas, offices could be heated and cooking done at far less cost than with coal-gas, and in many industries, such as the toy trade of Birmingham, it would often find very extensive applications.

Mr. Wilson informs us that it can be made and stored in the holder for less than sixpence per thousand cubic feet, and at this price it is a very cheap fuel. The lighting, which may be seen in operation at Stafford, is sure to attract attention from visitors. The light is as white and beautiful as the incandescent electric light; it is more agreeable than the glow-light, because the area of incandescence is larger in each light. All the gas-fittings are of the ordinary kind, and Bray's No. 3 burners are used, each heating one comb of magnesia rods, twenty-two rods in a comb. These rods are about one-sixteenth of an inch in diameter, by about one and a half inches long, supported with the lower ends about three-quarters of an inch above the burner.

Now as to the cost of water-gas. Much of course depends upon the size of the apparatus and cost of fuel, but under normal conditions, including depreciation and interest on capital, including also the gasholder, the cost may vary with the size of the plant, from fourpence to one shilling per thousand cubic feet. In mills and other places where it is possible to utilise the generator-gas, the water-gas could almost be made for nothing or looked upon as a residual product; in order, however, to give some guide as to the prime cost of water-gas and of the necessary plant required, it may be stated that in Germany:—

One water-gas apparatus for making 4,000 cubic feet per hour, consisting of two generators, scrubber, governor, meter, gasholder of 7,000 cubic feet capacity, steam boiler, main and buildings, cost about £1,300

One apparatus for making 20,000 cubic feet per hour, consisting of two generators and two superheaters, one scrubber, cleansing box, governor, meter, gasholder of 14,000 cubic feet capacity, buildings, mains, and blowing apparatus, about.. £3,000

An apparatus for making 40,000 cubic feet per hour, consisting of two generators, two scrubbers, steam boiler, blowing engine, purifying apparatus, buildings, mains, and gasholder for 40,000 cubic feet, about £3,500

These figures, of course, are subject to much variation, according to locality and prices of materials, and the patent royalties are not herein included, but we believe they are made subject to mutual arrangement, and in Germany have been generally charged upon the amount of fuel consumed. According to the degree of purity of the fuel and the construction and size of the apparatus, so will the fuel vary per thousand cubic feet of water-gas produced, but the minimum and maximum limits may be fixed at from 60lb. to 120lb. of coke per thousand cubic feet of water-gas. For working the small apparatus one man per shift would be necessary; in the larger ones, two to three men per shift. For blowing power, three-quarters of a horse power per thousand cubic feet per hour is all that is requisite.

A water-gas apparatus possesses one very great advantage over furnaces for the manufacture of ordinary coal-gas. A water-gas plant may be left at a standstill over the week-end, during which time a very small amount of fuel suffices to keep it warm. Half an hour's blast on Monday morning then suffices to get the apparatus in full swing.

It appears that at the present time the establishment of Messrs. Schulz, Knaudt, and Co., at Essen, is lighted by about 600 water-gas lights, besides being used for many metallurgical purposes. For a long time past their offices, their officers and workmen's houses, have been lighted and heated by water-gas, and all the cooking done by it, so that this establishment may well lay claim to being pioneers in a movement which, if generally carried out, would remove the so-called fogs from our towns and cities and make them a little more healthy for the dwellers therein.

SPECIAL NOTICE.

[illegible] **The Chemical Trade Journal** [illegible] encouraging character, and proves [illegible] that the Journal supplies a distinct want in the [illegible] trades.

[illegible] the proprietors [illegible] to increase [illegible] the Journal, so as to make it *par excellence*, **the Organ** [illegible] the numerous and important industries in [illegible] established, and they will at all times be [illegible] from subscribers information and suggestions [illegible] improvement.

[illegible] intimate that the Publishing Office [illegible] central and convenient premises, [illegible] request that all communications in future be [illegible]

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[illegible] that [illegible] *Chemical Trade Journal* offers [illegible] bringing trade announcements under the [illegible] portant class of buyers, and when it [illegible] advertisements is not an expensive [illegible] department of the Journal will be [illegible] ok to extend their business by [illegible] teenth century enterprise and [illegible] vertising.

Correspondence.

**** We do not hold ourselves responsible for the views expressed by our correspondents.*

TECHNICAL EDUCATION

To the Editor of the Chemical Trade Journal.

Sir,—The admirable letter of "Dubious," in your issue of November 12th, takes the gilt so completely off Mr. Watson Smith's gingerbread that it is scarcely necessary to "paint the lily" by adding to his remarks. But to show that "Dubious" is not alone, I ask your permission to say a very few words. As Mr. Watson Smith occupies the unique position of being about the only professor of chemistry in an English college who has had actual experience as a works chemist or manager, I in common with many others attach much importance to his utterances. When, however, I read his address at New Mills in the *Chemical Trade Journal* for October 29th and found the old tale of German superiority being retold, I confess I rubbed my eyes and looked a second time at the title, thinking I must have mistaken Schmidt for Smith, which I was sorry to find I hadn't.

Mr. Smith says "knowledge combined with energy are *practically* wealth and position." Oh! that word *practically*, how much it is made to cover. Whenever a man finds it difficult to persuade other people that a capital A is equal to a bull's foot, he says "it is; *practically*." There are within the four seas of Britain thousands of men, among them plenty of trained chemists, who have abundance of knowledge and any amount of energy, who have no more wealth and position actually (not *practically*) than many a working artisan has. "Dubious" has told him why. Pray let us know, Mr. Smith, if all, or any considerable proportion of, these Germans—these clever, awfully-clever Germans—(take chemists for instance)—are in the enjoyment of wealth and position as the reward of their "knowledge, combined with energy;" and if so, why in the name of all that is everything don't they stop at home and enjoy both, instead of—as was proved by a writer signing himself "Menenius" in your journal some weeks since—coming over to England to injure English chemists by taking miserably low salaries? Mr. Smith says in a subsequent portion of his address: "The German and Swiss is satisfied with far less wealth to retire upon than the Englishman." Perhaps the apparent incongruity is thus explained, or perhaps Germans are well content to retire on more than they deserve. Mr. Smith tells us that he has been in Germany, and I notice that the gentlemen who have *been* to Germany not infrequently try to give prominence to the fact by asserting loudly that things German are better than things English. I am reminded of those travellers in the far East, who return and tell us that gunpowder, printing, the mariner's compass (and possibly they would now add the telephone and phonograph) were known to the Chinese in the *nth* year of the dynasty of Ly-ing-Thing, ages upon ages ago. I can only in the one case, as in the other, suggest that such tales may possibly be believed at Portsmouth or Chatham.

"Dubious" hits hard at the craze for technical education, and those who proclaim that it will change the present order of things and give wealth and position to the hewers of wood and the drawers of water. Sir, one of the Red Republicans of 1793 was telling a good peasant of La Vendée:—"We are going to pull down your churches and your steeples; all that recalls the superstitions of past ages, and all that brings to your mind the idea of God" "Citizen," replied the good Vendean, "pull down the stars then." So might we retort on these technical educators: "Pull down the very foundations and principles of political and social economy."

After all, on looking at the address as a whole, I thought of the lines—

> That all this brave prolonged defence,
> Was only just a cute pretence
> To baffle legal men of sense,
> And lead them off the scent.

struck me that while advocating more thorough and scientific instruction, Mr. Smith did not even one reason why the present technical instruction is and point one way in which it might be remedied, the fact that nearly all our professors have had no perience in chemical works (Mr. Smith is himself an exception), and they are therefore more or less of modern chemical technology. This state of owing to such facts as the following:—A committee d somewhat thus—a retired bacon dealer, the local r editor, a brassfounder, a bill discounter, an inde- gentleman, and a lawyer—had to select the best t of a certain number of applicants for the pro- of chemistry in a technical college. There were e applicants several men who produced unimpeach- ence of sound training as theoretical and practical as lecturers of undoubted ability, and as successful and above all, in addition to these qualifications, been successfully engaged for years in the every-day of chemical technology as analysts and manufac- The committee cast aside these men, and pitch- to the professorship a man with a university degree, octor of Phudge?), or something of the sort, who ve been only too glad if he had known something cal chemistry; who had never done more than pay wo "blind-fold" visits to chemical works, and st testimonials were from old college chums (!) It nal misfortune that these appointments frequently committees of men utterly unfit to make a wise How can technical chemistry be efficiently taught man as the above?

ple truth, sir, we have had German chemical y preached at us *ad nauseum*. It is high time the ed, and I am glad to see some indications that it is I live in hopes of seeing the German invasion the German chemists turned bag and baggage out d, and competent English chemists restored to for which their abilities well fit them, and where I will be adequately remunerated.

the system of tipping, it will be found that much of to employers paying low salaries. The remedy s.—I enclose my card, and remain,

"UN QUI N'Y CROIT PAS."

PUBLIC SANITATION.

well-attended meeting of the members of the Asso- f Public Sanitary Inspectors, held at the Westminster fall on Saturday evening, the 5th inst., Mr. Hugh er, chairman of the council, delivered his inaugural He pointed out that the association had grown in estimation, and now numbered two hundred members, even hon. members, including the names of many of distinguished scientists of the day, and thirteen members. The movement was also spreading widely land. A branch which numbered fifty-two members formed for the North-Western district, another with t members had been formed for the Midland division, eral others were projected in various large centres of n. The vibration of public thought and sentiment alth questions had been very clearly indicated in ys. The full ripeness for legislative action had been anifested in the report of the Royal Commissioner, by numerous bills and suggestions emanating from less influential personages and societies directed to dment of the existing sanitary law. It was the duty ncil to be forearmed; accordingly a report had been nd presented to the President of the Local Govern- ard, and had been received most favourably. The clared that the most essential amendments required ry law to secure efficient administration were—(1) tary officers should be duly qualified, and should only able from their position by local authorities for mis- neglect of duty, or proved incompetence. (2) That officers should be held more directly responsible for ment of nuisances, and should be required on their own responsibility to serve notices on behalf of local authorities, requiring all necessary works to be done for that purpose, such notices to be read to the local authority or committee appointed for such purpose at their meeting, and if approved should be adopted, and proceedings ordered to be taken for the abatement of nuisances. Penalties to accrue from the date of inspection notice. (3) That more simple, stringent, and summary powers should be given for the abatement of nuisances; and lastly, that a minimum rate of salary should be enacted for sanitary inspectors. Regarding the qualifications of sanitary inspectors, the examination test was not all that could be desired. A medical officer of health should be a man who had devoted his whole life to the acquirement of medical knowledge. A sanitary inspector's business was to cure disease-breeding houses. He should be a man trained and skilled in building construction, so that he might be competent to detect and to correct the errors and the misdeeds of builders and builders' workmen, and even the mistakes of architects, and to diagnose and trace out the hidden causes of disease; otherwise he and the dwellers in houses would be largely at the mercy of interested persons. It could not be maintained that any man taken from any walk in life was sufficient to meet these requirements. After discussing the various proposed sanitary reforms, he contended that the work of preventing disease and conserving the health of a community was an honourable function of the highest importance, and it demanded in the public interest an intelligible law, perfect freedom from the influence that often trammels and impedes its operations, and higher recognition by the State than had yet been accorded.

Mr. G. B. Jerrom, late chairman of the association, having been presented with a testimonial on behalf of the members of the association, said it was encouraging to find that the Government had at last been induced to recognise that there were such people as sanitary inspectors, and that they were badly paid, and that there was great need of sanitary reform. The fact that 86 cases of scarlet fever had been received by the hospitals the day previous, was sufficient evidence of the want of sanitation in London. Undoubtedly, sanitary inspection was inefficient, and the Government must awake to the to the necessity of assisting sanitary inspectors and ensuring the election of efficient men.

Mr. Thorne thought sanitary inspectors should be made more responsible than hitherto.

Mr. Holloway thought that to meet the requirements of a sanitary inspector a candidate should not only pass an examination, but serve for a time under some one acquainted with the duties of inspection. He contended that evils arose from the want of uniformity in the use of disinfectants. It was of the utmost importance that the substance used should be a disinfectant of the highest order.

A vote of thanks was then unanimously passed to the chairman for his address.

CONFERENCE ON TECHNICAL EDUCATION.

A CONFERENCE was held on Saturday night, the 5th inst., at the Finsbury Technical College, Leonard-street, City-road, to discuss the question of technical education. Mr. James Rowlands, M.P., presided. Professor Silvanus P. Thompson, Principal of the City and Guilds Technical College, Finsbury, opened the discussion with a paper on "The Present Position of the Technical Instruction Question." He referred to numerous institutions in the metropolis and he provinces wherein educational work of a technical character was going on, especially alluding to the group of agencies now established by the City and Guilds of London Institute, and contrasted the great efforts which were being made on the Continent to promote technical instruction, especially in Germany, with what had been done in this country. With regard to the future organisation of technical instruction, he contended that the Science and Art Department did not understand its first principles, and did not comprehend that the adaptation of the teaching to local wants and the adaptation of the design to the material we

the very essence of technical instruction. The friends of the technical education movement might congratulate themselves that the Technical Instruction Bill of last session was withdrawn before it reached committee. The first and most important point of all for the national organisation of technical instruction was to secure the creation of a real Education Department under a real minister of Education. In the discussion which followed some workmen in the cabinet-making trade said that technical education would be no good to the workmen unless it were appreciated by the public generally, as at present some of the shoddy work was palmed off by certain firms as first-class goods. Mr. B. Lucraft said he wanted to know how the sons of working men could get this technical education, and expressed his regret that the scholarships at the disposal of the London School Board were of a literary instead of a technical character. Mr. Owen Roberts, clerk to the Cloth-workers' Company, said that at a meeting of the court of that company last Monday a decision was come to to turn all the literary scholarships given by that company to the London School Board into technical scholarships. The proceedings closed with the usual compliment to the chairman.

BLACK SMOKE IN ST. HELENS.

(From the *St. Helens Advertiser.*)

THERE are few towns in the kingdom whose atmosphere is so largely impregnated with dense coal smoke as is that of St. Helens. The nuisance is admitted, and its abnormal density is too abundantly evident to permit of doubt to anyone who even occasionally travels a few miles beyond the limits of the borough boundary. That it is injurious to health and comfort, all who have felt the exhilarating influence of a sunny day in the country, can, on their return to their homes, feeling the difference, bear testimony if it is needed; while every housewife can testify to its destructive effects in the house, and the impossibility of cleanliness in her rooms if ventilation is permitted. The question that it affects health has, however, been settled long ago by the medical profession. This branch of the question we need not therefore enter upon; we propose rather to deal with the practical aspect of the prevention of the nuisance. To live with a continual omnipresent thick cloud of coal-smoke intervening between the town and the sun is not only an irritating nuisance, but it positively robs life of half its pleasure, and greatly tends to promote feebleness and lack of vivacity in men, women, and children. In the discussion of this question we are sure to be met with the objection—do you want to shut up the works? We at once reply we want to do nothing of the kind. We believe that all that we ask for can be accomplished without the slightest injury to any manufacturer or other producer of dense smoke; and we believe that all large manufacturers or users of steam boilers can readily adopt means which will secure the desired end. We are also desirous of testifying in the outset to much improvement having been made of late years, and at considerable expense to the experimenters. All kinds of "mechanical stokers" and other curative means have been invented, and many of them tried by one or other of our local manufacturers in the hope of abating the smoke nuisance. This seeking after improvement has done much to prove that even by careful "hand stoking" a great deal of the waste of heat-producing power—dense smoke—can be prevented from escaping up the chimney, to the obvious loss of the manufacturers and the annoyance of the public. In addition to mechanical stokers [illegible]oppers there have been moveable firebars, solid and [illegible] contrivances for the admission of cold and hot air, [illegible]oting bridges of every form, size, and material. [illegible]rly all, of these various contrivances had some [illegible]duced some good result when first applied, but [illegible] men possessing little or no technical know- [illegible] the old system of charging to its utmost [illegible] and then resting or turning to some [illegible]ght about failure, and the "new [illegible] or nearly so. A great amount of ingenuity has been spent over the invention of mechanical stokers, of which there is quite a puzzling crowd in the market. Some are arranged on an ingenious plan of delivering and spreading minute quantities of small coal or slack evenly over the fire, and thus aiming at instant ignition, and the consequent prevention of the formation of any black smoke. Others are so contrived that the fuel is placed in the very front of the fireplace, and then gently and gradually forced forward, and becoming ignited, the smoke generated passes over the full length of the red-hot fire and is consumed in its transit towards the chimney. Both these methods, when carefully attended to, are very, if not completely, effective, but they require constant care and cleanliness, without which they soon get out of order and consequently non-efficient, and masters and managers get weary of the wear and tear and worry, and by-and-by the costly contrivance has to be discarded. Men whose duty it is to watch these matters and report thereon, have declared that the Smoke Nuisance is an offence against the law, and what is of much more importance, from a sanitary point of view, they have declared that it is curable, and further, that this great desideratum can be effected without putting the manufacturers to any sensible amount of expense, while the result will be a considerable advantage to them even in a pecuniary point of view. If the latter statement can be proved, there should be no hesitation on the part of the persons who turn out such large quantities of dense smoke, seriously impairing the purity of the atmosphere of our town, and consequently the health and comfort of the inhabitants, to apply the cure. A recent invention, of a very simple and inexpensive character has been introduced into this town, and put to the test of experience. The patent, for such it is, is the property of Mr. Whittle, of Bury, taken out three years ago. It has been quietly and gradually, we are informed, growing into use, and its simplicity and usefulness is admitted wherever introduced. At the late annual meeting of the British Sanitary Association, it was well spoken of as a cheap, simple, and effective means of abating black smoke, and especially it was said to be efficacious where there was a bad draught. It can be applied to almost any kind of flue, and it is not restricted to one mode of application. Mr. Alderman McKechnie has had it applied to a number of boilers at his copper works, with the result that not only is there a considerable abatement of smoke but that the steam-raising power of his boilers has been greatly improved, to an extent, we are informed, that more than compensates for the cost of application. It is estimated that about 2,500 tons of coal is consumed every working day in St. Helens, and it probably would not be far off the mark to assume that of this enormous total, 2,000 tons are consumed by our manufacturers. Now, if all our boilers and furnaces were provided with some efficient means of consuming their smoke, might we not hope to see two-thirds of all the black smoke of our present vitiated atmosphere disappear, and our town and its surroundings become almost as bright on every day of the week, as it is on Sundays from early morn till six or seven o'clock, when the firing up begins for the succeeding work-a-day week. Who can estimate the blessings of a pure atmosphere, and which of our wealthy manufacturers would like to be last in bringing about so desirable a change.

ANOTHER CONGREGATION ASPHYXIATED.

A SERIES of evangelistic services having been arranged to be held in connection with the Baptish Church at Farsley, near Leeds, which has a large membership, a preparatory meeting was held on Saturday evening the 12th inst., in the Rehoboth Schoolroom, Bagley, which was conducted by the Rev. John Aldis, of Sutton-in-Craven. The service, which was largely attended, had proceeded for some time, when the minister announced a hymn to be sung. A youth named Charles Keighley, who was presiding at the harmonium, failing to play the accompaniment after the hymn had been read out, it was observed that he was lying with his face and arms on the instrument. At first it was thought he was asleep, but it was found that he was unconscious. He was

therefore removed to his home near. When the doors were opened the inrush of air appeared to affect the members of the congregation, many of whom had already begun to experience peculiar sensations, and ten of them immediately swooned away, and had to be removed to the adjoining graveyard. As several others showed similar symptoms, but in a lesser degree, the service was brought to an abrupt close. For a time considerable commotion prevailed, the whole of the congregation not seriously affected being fully engaged in administering restoratives to the unconscious members. The affected persons were, after a time, removed into neighbouring houses, and from thence in cabs to their homes. Some recovered after a time, but others were very ill all night; and in one case medical assistance had to be obtained, the doctor (Dr. F. W. Lambert) pronouncing it a case of asphyxia. The cause of the attack appears to have been brought about by the heating apparatus fixed in the school. The apparatus is fed with coke, and the atmosphere on Saturday being very heavy, it affected the draught, causing sulphurous fumes to be forced out under the boarded floor of the schoolroom. Steps were at once taken to thoroughly ventilate the room, but it was not deemed prudent to hold the usual Sunday school in the place the following day. Effective measures will be taken forthwith to prevent a recurrence of the circumstance. On inquiry later it was found that most of the sufferers were in a fair way for recovery.

HOME-MADE CHEESES.

At the London Dairy Show a silver medal and prizes were offered for the best exhibits of English soft cheeses other than cream, with the object of inducing persons to make some of the leading fancy and ripened varieties, and for the best skim-milk cheese. In the first-named class an ordinary new cream cheese was awarded the prize, an English Camembert being placed second. In both classes the cheeses were analysed by the Society's chemist, Mr. Lloyd. The first-prize cheese was found to be made of all cream, and it has been disqualified, while the Camembert was found to be made of milk only, and thus obtains the medal. In the skim-milk class both the prizes were awarded to cheeses which upon analysis were found to contain 1·96 and 2·01 per cent. of butter fat respectively. In other words, they were practically made of two-thirds new milk and one-third cream. With such opponents farmers who make *bonâ fide* exhibits cannot possibly compete.

THE LIVERPOOL MINERAL MARKET.

The market has ruled steady during the week. Manganese: imports have continued small, and prices on the whole are something firmer for best qualities. Magnesite (containing 98 per cent. of carbonate of magnesia): imports have been slower, but prices are unaltered at 30s. to 35s. for raw lump; raw ground, £6. 10s.; and calcined ground, £10 to £11. Bauxite (Irish Hill brand) has somewhat improved in demand, and prices are easy. Lump, quoted at 20s.; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French chalk: imports are almost nil, but there is little alteration in prices, namely, 85s. to 90s. for medium, and 95s. to £5 for best G G B. Barytes (carbonate) continues scarce, especially for carbonate; selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate: best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, G G B brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone is unchanged; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Iron ore quiet. Purple ore, 7s. Emery-stone quiet £5. 5s. to £5. 15s. for lump; smalls, £5. Fluor and felspar steady. Fullers' earth quiet; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda continue quiet. Tungsten metal at 2s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore quiet at 80s. to 85s. for 50 %, and 60s. for 40 %. Antimony ore, £8 to £10 for fair quality; best, £18. 10s. Antimony metal, £31 to £32. 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potter's lead: Smalls, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 60s. to 80s. Strontia steady; sulphate (celestine), 19s. to 20s. Carbonate (native), £15 to £16; powered (manufactured), £11 to £12. Plumbago: Best Ceylon lump, £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £5 to £15 per ton. French sand, 19s. Ferro-manganese firmer, 80 % packed, £11. 2s. 6d.; 70 % packed, £10; 60 % packed, £8. 16s.; 50 % unpacked, £7. 15s.; 40 % unpacked, £7. 5s. Spiegel, 20 % £4. 12s. 6d. Silicon spiegel, 9 %, £8. Chrome pig, 9 to 10 %, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8.

ITALIAN CHEMICAL STATISTICS.

(From the *Chemist and Druggist.*)

Official returns have been published relating to the Italian trade in chemical products during the first six months of 1887. In that period 1,827 tons boracic acid were exported from Italy, against 1,722 tons in the first half-year of 1886. Of Italian refined borax 344 tons were exported. Formerly nearly the whole of the boracic acid produced in Italy was exported, but recently large works have been established in the country by the firm of Larderel, and a considerable part of the acid is now treated at these works. The export of cinchona salts from the Milan and Genoa works rose from 5,000 to 10,000 kilos. (176,500 oz. to 353,000 oz.) This includes, besides quinine sulphate, all the minor cinchona salts. The export of the latter has been much assisted by the establishment of drawback on shipments abroad. The importation of soda nitrate, which is principally used in the manufacture of nitrate of potash by boiling with chloride of potash, rose from 2,600 to 6,100 tons. The cause of this advance is due to the increased requirements of gunpowder by the War Department. Soda imports rose from 910 to 1,160 tons, caustic soda from 3,800 to 4,000 tons, oxides of iron and lead from 1,400 to 1,700 tons. The alum works of Civita Vecchia have not been so successful as was expected, it being found preferable to export the crude mineral. The shipments of winelees and argols rose from 3,600 tons to no less than 11,200 tons. More lemon juice was also exported, viz., 503 tons raw and 1,802 tons concentrated juice, against 220 and 782 tons respectively. This enormous increase in the shipments is due to the large crop of "agrumi" and the cheapness of the lemons; but it seems inexplicable that under these favourable circumstances the manufacture of citric acid in Italy should still be so much neglected. Of common soaps, 1,959 tons were exported in the first six months of 1887, and of medicinal preparations, 834 cwt. in the first half-year of 1886. The total value of the imports of chemical and medicinal products, resins and perfumery, was £1,000,000, the exports £1,160,000.

Trade Notes.

Broxburn Oil Co.—We understand that Mr. J. G. Leadbetter, of Edinburgh, and late of Glasgow, has been appointed a director of the Broxburn Oil Company (Limited.)

Serious Gas Explosion at Bedminster.—About eleven o'clock on Tuesday night, Nov. 1st, a remarkable explosion of gas occurred at Wellington House, Church-road, Bedminster, in the occupation of Mr. Archibald Bromfield, by which the ceilings were lifted up about 4 inches.

Pyridine.—A process for purifying anthracene by means of such bases as pyridine and aniline, has been patented by the Hamburg Chemical Works Co. These bases dissolve anthracene when heated and deposit it on cooling, but retain most of the impurities.

A NEW SIAMESE BRONZE CURRENCY.—Her Majesty's Consul-General at Hamburg informs us that the machinery of the Hamburgh Mint, which has during recent years been seldom called into requisition, will be shortly employed in the coinage of a new bronze currency for the kingdom of Siam, a contract for no less than 25,000,000 coins of this metal having been given to Herr Paul Pickenpack, the Hamburg Consul-General for his Siamese Majesty. One side of the coins, which will be of several denominations, will bear the impression of the Royal portrait, while the other will be adorned with a tasteful allegorical figure representing Genius. The metal for this coinage is being supplied by a Westphalian firm. The preliminaries were settled between the brother of the King and Consul-General Pickenpack, who was in attendance upon His Royal Highness during the visit of the former to London upon the occasion of Her Majesty's Jubilee. This bronze coinage will replace the present zinc currency known as ½ and ¼ pai. Taking the population of Siam at something in excess of five millions, a supply of about five coins per head will be issued. The work of stamping the metal is estimated to keep the Hamburg presses in employment for about five months. As recently as 1860 the Siamese silver coinage still consisted of roughly spherical pieces of silver of various sizes, which were formed of portions of silver rods which were first bent together and afterwards trimmed by the ends being hammered, the whole being then stamped with two or three devices denoting the value, etc. In 1861, during the visit of the Siamese Embassy to England, a contract was entered into with Messrs. Ralph Heaton and Sons, of Birmingham, for the delivery of the present circular silver coinage of seven denominations. Considering the rapid progress of Western ideas among Oriental nations, English firms ought to be on the watch for the visits of Oriental guests of high rank, lest further contracts, formerly executed in England, should also be secured by our energetic German cousins. The drawing up of a legal code upon a European basis, for the purpose of which a member of the English Bar recently proceeded to Bangkok, does not seem to have made much progress, and a rumour has been circulating among German jurists to the effect that this work also was likely to be placed in German hands.

CARBOLIC ACID POISONING.—George West, aged five years, was last Saturday admitted into the Blackburn and East Lancashire Infirmary suffering from the effects of having swallowed a dose of carbolic acid. The boy had got possession of a bottle containing carbolic acid and drank the contents.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

SULPHATE of ammonia has made rather a sharp ascent, this constituting the most marked feature of the northern market. A week ago it was bought at £11, or a fraction less, but scarcity becoming felt, the quotation ran up to £11. 7s. 6d. Leith. Business has perhaps not yet been actually done at that figure, but it has at £11. 6s. 3d., and the expectation is that £11. 7s. 6d., and even higher, may be done within a day or two. Refined alkali is a shade firmer also caustics. The others for the most part are stationary, or partially giving way, bleaching powder and soda crystals being within the latter category. Sulphate of copper mounted still higher, but has receded again to last week's quotation (£15), and the boom is probably over for the time. Paraffin chemical continue to get thinned down in makers' stocks, but foreign importations hold the balance and prices do not [illegible] y, but are at about the level of past few weeks. [illegible] had for favourite brands of 885° lubricating [illegible] current are: Soda crystals, 45s. net [illegible] less 2½ [illegible] Glasgow; borax, English [illegible] acic acid, £40 net Glasgow; soda-ash, [illegible] one; caustic soda, white, 70°, £6. 5s., [illegible] cream, 60°/62°, £6. 5s., less 2½ [illegible] soda, 5 cwt. casks, £5. 15s., and refined alkali, 48/52°, 11s. d. less [illegible] f.o.r. Glasgow; bleaching powder, £7. 17s. 6d. f.o.r. Glasgow; bichromate of [illegible] 4½d., and of soda, 3½d., less 5 and 6 °/₀ to Sco[illegible] English respectively; nitrate of soda, 8s. 9d.; chl[illegible] potash, 6d., less 5 °/₀; sulphate of ammonia, £11 [illegible] £11. 7s. 6d. f.o.b. Leith; paraffin scale, hard, 2½[illegible] 1¼d. to 2d.; paraffin wax, 120° semi-refined, 3d., re[illegible] 2d.; paraffin naphtha, 7½d.; burning oil, 5d. [illegible] lubricating oil, 885°, £6 to £6. 10s.; sulphate of [illegible] £15, less 5 °/₀ Liverpool. Last week's Clyde [illegible] include 31,431 packages sugar and 51 barrels rosin.

THE ALKALI TRADE.

SALTCAKE is being sold at 20s. to 21s. for early d[illegible] and at this price buyers would contract for all next y[illegible] sellers hold together for 24s. to 25s., consequently th[illegible] ness is but of a retail character, and both buyers and [illegible] will have to give and take the market prices of the [illegible] spot or monthly parcels, unless the price of caust[illegible] advances or the saltcake makers change their min[illegible] neither possibility seems probable just now.

Caustic soda is now again going through the ann[illegible] cess of "bearing" for the paper-makers' 1888 contr[illegible] *dealers* who for the past dozen years have been [illegible] invariably successful in discounting the market. The [illegible] however, a "dark horse" in bleaching powder whi[illegible] cannot calculate upon with the same degree of ce[illegible] consequently the value of this article is practically [illegible] makers' hands. The advance since the convention to £[illegible] f.o.r. makers' works has had the effect of drawing [illegible] large buyers for 1888 at £7. 5s., and the makers migl[illegible] advantage to themselves clear out for next year at thi[illegible] ere the evil day comes when competition will fix the p[illegible]

THE MISCELLANEOUS CHEMICAL MARK[illegible]

PRICES upon the whole keep steady and there are [illegible] portant changes to record. Generally speaking, pri[illegible] firm and business to a fair extent has been done for de[illegible] during 1888. There are some slight movements in an [illegible] direction, especially in tar products; benzol 90's, crud[illegible] tha, solvent naphtha and anthracene being in good d[illegible] Sulphate of copper maintains the advance. Mur[illegible] ammonia selling freely for prompt and forward, at [illegible] £23 per ton. Oxalic acid firm at 4d. to 4¼d., accor[illegible] quantity. Acetates of lime, brown and grey, £9. 1[illegible] £13. 15s., at usual points of delivery, are in better r[illegible] Acetate of lead quiet at £26. 10s. Fertilisers are [illegible] sulphate of ammonia, nitrate of soda and superphos[illegible] keep at evenly low prices. Sheet lead, litharge, a[illegible] products are without change, but foreign pig lead h[illegible] quoted lower during the week. Acetic acid is selling [illegible] at 15s. 6d. per cwt. for 40 °/₀. Wood naphthas are [illegible] Brimstone has improved in value. Chromic acid 8[illegible] selling at 4½d. per lb. Soda-ash and caustic soda a[illegible] and the B.M. alkali has been sold recently at extrem[illegible] prices, which would indicate a possible further reduc[illegible] price of soda-ash generally.

THE TAR PRODUCTS MARKET.

BENZOI prices are now 3s. for 90's and 2s. 4d. fo[illegible] and a fair business has already been done at these figur[illegible] there are sure indications that the buying is chiefly, [illegible] altogether for or from one source, which is full to over [illegible] for all next year; but if this attempt to force up p[illegible] successful to the extent of inducing some of the consu[illegible] cover their requirements for the next year at the abov[illegible] the tar distillers and not the speculators (who are [illegible] "Bulls") will have to nurse the surplus production f[illegible] The question now is "Who shall hold the baby?"

Crude carbolic is reported not quite so firm; but th[illegible] not seem to be any actual reduction in price. Anthr[illegible] firm, and makers ask 1s. per unit on account of the p[illegible] of 11½d. by purchasers. Pitch remains a dead let[illegible]

ks at Runcorn continue to grow to an inconvenient Crude naphtha rises in sympathy with benzol, and distillers should look out for some good purchasers for ar.

HE SULPHATE OF AMMONIA MARKET.

the month advances it is rendered more and more that the speculators have oversold themselves, and hey are in the makers' hands. The dealers have oured to force prices down to the level of those ruling ovember, but success has not attended their efforts. narket is now so situated, that were sulphate in the of one man it would leap up to an extraordinary but being in the possession of many, the speculators en able to play off one works against another.

lay sulphate may be said to be value for £11. 12s. 6d. ndon and Hull, and £11. 10s. Liverpool and Leith, ut very few parcels offering.

THE PATENT LIST.

following list has been compiled expressly for THE ICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

G. E. DAVIS. For improvements in the manufacture of chlorine. November 4.

M. J. HARTUNG and W. GALLAGHER. For an improvement in the manufacture of lubricating oils and greases. November 4.

J. C. KRAYENBUHL, H. C. PETERSON, and C. C. BURMEISTER. For a new or improved process for the cleaning or separating of tar from ammoniacal liquor and other matters. November 4.

F. WORKMAN, H. WORKMAN, and A. WORKMAN. For improvements in presses suitable for extracting oil from linseed and for other purposes. November 7.

C. D. ABEL. A communication from G. C. Zimmer, of Germany. For production of yellow, red, and violet colouring matters from tetrazo-diphenyle and tetrazo-dilolyle. November 7.

H. SENIOR. For a process for the separation of zinc hydrate as a crystalline body from solution in the fixed alkali hydrates. November 7.

L. R. BAZIN. For a process and apparatus for conversion of phosphates into thermophosphates. November 8.

G. W. HART. For improvements in obtaining carbonate of soda and other products, and in apparatus suitable for this purpose. November 8.

S. PITT. A communication from T. G. Hall, of United States. For process of refining hydrocarbon oils. November 8.

G. THOMAS. A communication from H. Schulz, of Germany. For the manufacture of a certain dye matter. November 9.

A. FELDMANN. For improvements in the production of the fluorides of magnesium, of strontium, and of baryum. November 9.

J. DAVENPORT. For improvements in the manufacture of manuring compounds. November 9.

J. Y. JOHNSON. A communication from The Badische Anilin and Soda Fabrik of Germany. For improvements in the manufacture or production of red colouring matters suitable for dyeing and printing. November 10.

COMPLETE SPECIFICATIONS ACCEPTED.

W. B. GILES and A. SHEARER. For improvements in the manufacture of phosphoric acid. November 16, 1886.

29. J. RAMSDEN. For improvements in injectors or sprays for cocaine or morphia, or such like drugs. January 1, 1887.

285. E. HUNT. A communication from G. Thomson, of United States. For improvements in obtaining silver from ores, mattes, or compounds containing it. January 8, 1887.

381. J. C. STEVENSON, M.P., and J. G. TATTERS. For improved disinfectant and oxidising agent. Jan. 10, 1887.

451. R. V. TUSON. For new or improved combination of ingredients, and the production of powders therefrom, for disinfecting and deodorising purposes. January 11, 1887.

1751. H. H. LAKE. A communication from Count Rudolphe de Montgelas, of United States. For improvements relating to the extraction of aluminium from its chlorides and to apparatus therefor. February 3, 1887.

13409. S. C. ROWELL and J. W. NEWALL. For improvements in the manufacture of plumbic oxide or litharge, and in apparatus employed therein. October 4, 1887.

13450. S. R. DICKSON. For a process and apparatus for the manufacture of gas for heating and illuminating, and of cyanogen or some of its compounds. Oct. 4, 1887.

13627. H. KENYON. For improvements in the production of illuminating gas, ammonia, and other products, and in apparatus therefor. October 8, 1887.

13746. B. J. B. MILLS. A communication from T. B. Fogarty, of United States. For a process of and apparatus for manufacturing ammonia. October 11, 1887.

13747. B. J. B. MILLS. A communication from T. B. Fogarty, of United States. For a process of and apparatus for producing sulphate of ammonia. October 11, 1887.

Letters Patent have been issued for the following:—

10868. J. LEA and H. R. HAMMOND. For operating on zinc ore for producing chlorine, also zinc, and the utilisation of said zinc for coating metals galvanically. August 25, 1886.

13389. E. SOLVAY. For a new or improved continuous furnace for the production of chlorine. Oct. 20, 1886.

13762. W. BRAMLEY and W. P. COCHRANE. For the manufacture of hydrated carbonate of magnesia and other products produced therein. October 27, 1886.

14441. W. BURNS. For improvements in the manufacture of sulphuric acid under high pressure with agitation, and in apparatus for that purpose. November 9, 1886.

14617. O. IMRAY. A communication from Society Chemical Industry, of Basle. For manufacture of the ethyl-ether of a new acid. November 11, 1886.

Specifications of the following have been published. Postage 1d. each extra.] 1886.

15488. W. BURNS. Manufacturing sulphate of soda and bleach in one operation, etc. 8d.

15498. W. BRAMLEY and W. P. COCHRANE. Treating solutions of chloride of calcium to obtain chloride of magnesium, etc. 6d.

16118. H. KENYON. Producing sulphide of zinc and chloride of ammonia. 6d.

16244. T. B. WILSON. Treating and purifying sewage, etc. 6d.

1887.

126. H. J. WALDER. Producing colouring matter from carbolic acid, etc. 6d.

127. H. J. WALDER. Producing colouring matter from anthraquinone. 6d.

4283. A. DUPRÉ and C. N. HAKE. Disinfectants, etc. 6d.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in different localities may vary.*

		£	s.	d.
ACIDS:—				
,, Acetic, 25 °/₀	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6⅞
,, Arsenic, S.G. 200°	per cwt.	0	11	9
,, Chromic 85 °/₀	per lb.	0	0	4½
,, Fluoric	,,	0	0	5
,, Muriatic (Tower salts) 30° Tw.,	per bottle	0	0	6
,, ,, (cylinder) 30° Tw.	,,	0	2	9
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4⅛
,, Sulphuric (fuming 40 °/₀)	per ton	12	0	0
,, ,, (Brimstone 168°)	,,	4	5	0
,, ,, (Pyrites 168°)	,,	3	7	6
,, ,, (spent oxide 168°)	,,	3	17	6
,, ,, (,, 150°)	,,	2	5	0
,, ,, (Pyrites 150°)	,,	1	15	0
,, Tartaric	per lb.	0	1	6½
Arsenic, white powdered	per ton	10	12	6
Alum (loose lump)	,,	4	13	9
Ammonia, ·880 = 28°	per lb.	0	0	3¼
,, = 24°	,,	0	0	1¾
,, Carbonate	,,	0	0	3½
,, Muriate	per ton	22	0	0
,, ,, (sal-ammoniac)	per cwt.	34/- & 32/-		
,, Sulphate (grey), London	per ton	11	12	6
,, ,, (grey), Hull	,,	11	12	6
Aniline Oil	per lb.	0	0	9½
,, Salt	,,	0	0	8
Antimony	per ton	33	10	0
,, (tartar emetic)	per lb.	0	1	0
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	4	10	0
,, Sulphate (native levigated)	,,	3	5	0
Bleaching Powder, 35 °/₀	,,	7	12	6
,, Liquor, 7 °/₀	,,	2	12	6
Bisulphide of Carbon	,,	12	5	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 °/₀ f.o.b. London,	per unit per cwt	0	1	3
Benzol, 90 °/₀ ,,	per gallon	0	3	0
,, 50/90 ,,	,,	0	2	4
Carbolic Acid (crystallised 35°)	per lb.	0	1	1½
,, (crude 60°)	per gallon	0	3	10½
Creosote (ordinary)	,,	0	0	1¼
,, (filtered for Lucigen light)	,,	0	0	2¼
Crude Naphtha, 30 °/₀ @ 120° C.	,,	0	1	0
Grease Oils, 22° Tw.	per ton	1	10	0
Pitch, f.o.b. Liverpool or Garston	,,	0	11	0
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2
Copper (Chili bars)	per ton	47	15	0
,, Sulphate	,,	16	0	0
,, Oxide (copper scales)	,,	40	0	0
Glue	per cwt.	1	15	0
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	55	0	0
Iron (turnings)	,,	1	13	0
,, Peroxide (blue billy)	,,	0	7	0
,, ,, (bog ochre)	,,	1	13	0
,, (precipitated	,,	3	0	0
Sulphate (copperas)	,,	1	2	6
Sulphide (antimony slag)	,,	1	0	0
Lead (sheet) for cash	,,	13	15	0
,, Litharge (white)	,,	26	10	0
,, ,, (brown	,,	19	10	0
,, ,,	,,	22	10	0

		£	s.	d.
Lime, Acetate (brown)	per ton	9	15	
,, ,, (grey)	,,	13	15	
Magnesium (ribbon and wire)	per oz.	0	2	
,, Chloride	per ton	2	7	
,, Carbonate	per cwt.	1	17	
,, Hydrate	,,	0	10	
,, Sulphate (Epsom Salts)	per ton	2	10	
Manganese Sulphate	,,	19	10	
,, Borate	per cwt.	2	5	
,, Ore, 70 °/₀	per ton	2	10	
Methylated Spirit, 60° O.P.	per gallon	0	2	
Naphtha (Wood), Solvent	,,	0	4	
,, ,, Miscible, 60° O.P.	,,	0	5	
OILS:—Castor	per cwt.	1	4	
Cotton-seed	per ton	19	10	
Linseed	,,	19	15	
Lubricating, Scotch, 885°—890°	,,	6	10	
Petroleum, Russian	per gallon	0	0	
,, American	,,	0	0	
Silver (metal)	per oz.	0	3	[illegible]
,, Nitrate	,,	0	2	
STARCHES:—				
Sago	per cwt.	0	8	
Potato (farina)	,,	0	10	
Sodium (metal)	per lb.	0	6	
,, Carb. (refined Soda-ash) 48 °/₀	per ton	5	0	
,, ,, (Caustic Soda-ash) 48 °/₀	,,	3	17	
,, ,, (Carb. Soda-ash) 48 °/₀	,,	4	0	
,, ,, (Soda Crystals)	,,	2	12	
,, ,, (Crystal Carbonate)	,,	5	6	
,, Chlorate	per lb.	0	0	
,, Borate (Borax)	per cwt.	1	9	
,, Bichromate	per lb.	0	0	
,, Hydrate (74 °/₀ Caustic Soda)	per ton	8	2	
,, ,, (70 °/₀ Caustic Soda)	,,	7	2	
,, ,, (60 °/₀ Caustic Soda, white)	,,	6	2	
,, ,, (60 °/₀ Caustic Soda, cream)	,,	6	0	
,, Bicarbonate	,,	5	17	
,, Hyposulphite	,,	5	10	
,, Nitrate (95 °/₀) ex ship Liverpool	per cwt.	0	8	1
,, Silicate (glass)	per ton	5	10	
,, —,, (liquid, 100° Tw.)	,,	4	7	
,, Sulphate (Salt-cake)	,,	1	1	
,, ,, (Glauber's Salts)	,,	1	17	
,, Sulphite	,,	5	12	
Potassium (metal)	per oz.	0	3	1
,, Bichromate	per lb.	0	0	
,, Carbonate, 90%	per cwt.	0	18	
,, Chlorate	per lb.	0	0	
,, Hydrate (Caustic Potash)	per ton	22	0	
,, Nitrate (refined)	per cwt.	1	2	
,, Prussiate Yellow	per lb.	0	0	
,, Sulphate, 90 °/₀	per ton	9	15	
,, Muriate, 80 °/₀	,,	8	10	
Strontium Hydrate, 98 °/₀	,,	7	0	
Sugar, Beet	per cwt.	0	13	
,, Cane	,,	0	19	
Sulphocyanide of Barium	per lb.	0	0	
,, Ammonium	,,	0	0	
Sulphur (Flowers)	per ton	9	7	
,, (Roll Brimstone)	,,	5	17	
Superphosphate of Lime (28 °/₀)	,,	2	0	
Tallow	,,	23	10	
Tin (metal)	,,	140	0	
,, Crystals	per lb.	0	0	
Zinc (Spelter)	per ton	16	15	
,, Chloride (solution 96° Tw.)	,,	5	15	

Chemical Trade Journal,

URDAY, NOVEMBER 26, 1887.

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TO ADVERTISERS.

AL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

rst week of the approaching New Year we shall **ECIAL NUMBER** of the **Journal.** We pro- g our first volume to a close with the last Saturday er, 1887. The issue of January 7th, 1888 (No. 33), ence Volume II. It will be an enlarged special very general interest. We shall issue along with **-page** and **Index** for the first volume, together t and useful **Office Almanac,** suitable for our , which is now in course of preparation.

g our regular subscribers, our New Year's Number ed to **NOT LESS THAN 10,000 FIRMS AND UALS,** so that intending advertisers will see at his issue is worthy of their special attention.

explain that in our Publishing Department, we y carefully compiled lists—in most cases the result knowledge and information at our command—of of repute, both at home and in the main trading oad, connected with the various industries whose is our province to serve. We utilise these lists eek, by selecting a number of them in turn, and t free copies of the Journal to those firms who t become annual subscribers. The result is that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of the New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO,** numbering altogether, as we have stated, not less than **10,000** names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

THE COMMERCIAL AND TECHNICAL MUSEUM.

A CORRESPONDENT signing himself "Verax" has in a contemporary taken us to task for an alleged incorrect statement concerning the report of the above subject, which appeared in our issue of November 12th, and as we have every reason to believe in the correctness of our information, we are tempted to express the opinion that "Verax" would have carried more weight with his statement had he been bold enough to have declared his name. There is no difficulty, however, in seeing who inspired the letter in question, even if the real writer remains to a few unknown, for it must be patent even to the dullest perception that there are but few who treasure up obscure sentences in a Society Journal with the object of trotting them out as occasion requires.

It is rather good of "Verax" to claim for his hero the idea of first suggesting a technical museum for Manchester, seeing that the whole affair has been talked over, both publicly and privately, for many years, and long before December, 1886, it was open talk that such a scheme might be arranged in connection with the Manchester Chemical Club. In fact, we feel quite assured that the actual existence of the exhibits of the Chemical Section of the Royal Jubilee Exhibition was first brought about by the arguments of Mr. J. Carter Bell, the hon. secretary of the Chemical Section of the Exhibition, as of our own knowledge we can say that he used much eloquence in endeavouring to persuade some of the members of the Chemical Club of the advisability of exhibiting, not only chemical products, but actually the various processes of manufacture in operation.

And we may go back much further than this. It is within our knowledge that so early as the year 1875, a gentleman, well-known in Manchester, the managing director of a very large establishment, conceived the idea of endeavouring to found such an institution, and with it a Journal embracing every branch of the chemical trade, such as is now done by the Society of Chemical Industry. Circulars were issued, but we believe there were only about fourteen replies, and the matter was abandoned.

The quotation which "Verax" makes is quite a different thing to what is proposed now,—"A technical museum and depôt for samples and patterns of goods required by foreign nations." Were these samples exhibited at the Manchester Exhibition? If so, we imagine that the allotment committee with their usual acumen and foresight placed them in the position most suitable for them—however we did not see them.

According to the circulars issued to the exhibitors, or at least to some of them, as we have discovered that *all* exhibitors have not received a circular, the idea seems to be to find a permanent home for some of the cases of the late Exhibition; but as we feel sure that the whole affair is fraught with such difficulties and dangers—especially with a committee which does not command the confidence of the entire trade—it seems to us necessary to call attention to it again.

One cannot meet with the members of any one section or another of the chemical trade in and around Manchester

rising in front of the partition from a hot-air chamber through 1¾in. holes, one hole facing each zigzag channel. The air is driven by a 21in. fan through a 6in. sheet-iron pipe which is branched and laid in the side flues, whence the branches return by the bottom flue to the front, one for each furnace, when they are joined to a flat air conduit on the bottom of each ashpit. The air, thus heated to about 250° F., is delivered into the hot-air chamber at the back of the bridge.

The boiler is set in brickwork along-side an engine-shed in the open air, and is cased in bricks and mortar on the upper part and the far end. The front end is not covered. The draught, after passing through the boiler, returns by the bottom flue to the front, whence it passes by the sides to the back and the chimney. The chimney is of brick 2½ft. square at the top, and 42½ft. high above the level of the firegrates. The flueway through the damper-frame is 4ft. 10in. high, 1ft. 11in. wide.

The boiler was constructed expressly for experimental purposes, and had been but a few weeks in use prior to the commencement of the test trials. The safety-valves was set for a working pressure of 50lb. per square inch, and under this pressure approximately all the trials were made, the steam being blown off into the atmosphere by the main steam-pipe, for the most part, regulated by the stop-cock, and also by the safety valve.

It was arranged that the boiler should be tested in two comparative series of tests:—1st, with the Ashworth and Kneen system, adapted to the ordinary furnaces; 2nd, with the ordinary furnaces alone.

Three varieties of coal were used for each series of tests, as follows:—

(1) Davidson's West Hartley coal, large and small.
(2) Pope and Pearson's Haighmoor coal, Normanton, Yorkshire, large and small.
(3) Pope and Pearson's Haighmoor coal, Normanton, Yorkshire, small only, or slack.

Each fuel was drawn from the same wagon-load for both trials. The coals were broken when necessary, into lumps of 4 or 5in. cubic, and in all the trials they were stoked on the "spread-firing" system, being equally charged all over the grate.

The steam blew off from the boiler each day in a condition evidently dry, and practically free from priming. The recorded consumption of water is therefore taken as actually evaporated.

Six days of systematic trials were made: three days with the patent system applied, and three days without it. The period of each trial was nominally six hours. The boiler each day was in good working order, and the fires were allowed to burn low to a thickness of from 2½ to 3in. on the grate, in a state of redness, without smoking. The levels and condition of the fires were noted, together with the level of the water in the gauge-glass, and the time also. Then the trial was held to commence, and the fires were stoked with fuel from the weighed-out heap.

The cinders that fell into the ashpits were from time to time charged into the furnaces. The damper was maintained fully open for the whole time. The fire with Hartley coal was maintained at a thickness of from 4in. to 5in.; with Haighmoor coal from 4in. to 6in.; with Haighmoor slack from 6in. to 8in. The feed-water was supplied from a graduated tank in quantities of 126½ gallons at a time.

The temperature of the burnt gases in the out-going flue was observed by means of a Bailey's pyrometer, and the smoke-shade at the top of the chimney was regularly noted. Towards the end of the period of each trial, the fires were again let down to the same condition as at the commencement, the water level in the gauge-glass was also reduced to the same level as at first. The trial was then held to have ended.

It is remarkable that whilst less coal in each case is consumed per hour with the patent system, indicating a less active draught, a greater quantity of water was evaporated per hour, as is shown by the following table, abstracted from the large tables:—

COAL.

	Hartley. Patent.	Hartley. Ordinary.	Haighmoor. Patent.	Haighmoor. Ordinary.
f trial	1	6	2	5
per hour, lbs.	361·3	423·7	277·7	360·7
r ,, galls.	346·5	240·7	280·7	243·5
r per lb. of oal (212°) lbs.	11·316	6·741	11·960	8·044

	Haighmoor Slack. Patent.	Haighmoor Slack. Ordinary.	Averages. Patent.	Averages. Ordinary.
f trial	3	4	...	...
per hour, lbs.	230·1	287·1	290·0	357·2
r ,, galls.	213·5	190·2	280·7	224·8
r per lb. of coal 212°) lbs.	10·975	7·857	11·417	7·547

the averages for the three coals in the last two how that though, with the ordinary furnace alone nt. more coal was consumed per hour than with the stem; yet that with the patent system about 25 per re water was evaporated per hour, and that con- 51 per cent. more water was evaporated per pound th the patent system than by the ordinary furnace. ugmentation of evaporative efficiency corresponds nomy of 34 per cent. of fuel as the general average he comparative trials.

FINAL RESULTS.

ntation of evaporative duty with the patent system, ge 25 per cent.

ny of fuel, average 34 per cent.

) say—one fourth more water was evaporated per he consumption of one-third less fuel for an equal of water.

PREVENTION OF SMOKE.

rning of coal in the ordinary furnace was in each mpanied after each firing by the discharge of densely l brown smoke from the chimney, of from No. 9 to ade of the smoke-abatement scale, which gradually ighter until occasionally before the next firing it f. But, putting the case generally, it may be stated regular firing, smoke was practically continuous, ot completely clear off in the intervals of firing.

the patent furnace was in operation, the prevention with regular firing and a good steady blast of heated for each of the three fuels used absolute and con- orresponding to No. 0 of the scale. When the air- weakened or interrupted, dense smoke generally m the chimney, but it speedily cleared off when the restored.

luced rate of combustion of coal in the patent fur- en compared with that of the ordinary furnace, oticed, points to a retarding action of the perforated behind the bridge. It did not appear that this e action was harmful, on the contrary, it operated ly in, to some degree, detaining the combustible l promoting the action of the furnace as a gas-

frequently observed through the spy-holes at the the furnaces were filled with smoky-red flame and le gases, whilst the products of combustion behind ion were, on inspection, found to be flameless and nt, and the chimney-top was perfectly clear.

idence of prompt and complete combustion demon- a very forcible manner the efficacy of the partition ssemblage of zigzag passages, and it is corroborated tion of a largescale model of the partition furnace, as constructed with spy-holes at various places, which the brilliant streams of flame that emerged partition could be readily observed with their inter- ovements, resulting from the right-hand and left- charges already noticed. When the air-blast was from the model, the flue behind the partition was with black smoke, which was speedily displaced by mes when the blast was restored.

clusion, I may state that, in my opinion, from the of the test trials with the Ashworth-and-Kneen system of furnace, applied to a double furnace multitubular boiler, an economy of upwards of 30 per cent. of fuel can be effected for the same evaporative duty, and that 25 per cent. more water can be evaporated per hour, as compared with the ordinary furnace; also, that with ordinary good management, smoke can be absolutely and continuously prevented.

With regard to the economy to be expected by the application of the Ashworth-and-Kneen system to Lancashire and Galloway steam boilers, there would, in my opinion, be a clear saving, the amount of which can best be determined by the results of special trials.

For multitubular marine boilers, the economy of the system under like conditions, may be expected to equal that effected with the experimental boiler.

THE LATE ROYAL JUBILEE EXHIBITION.

THE members of the Exhibitors' Club at the recent Exhibition at Old Trafford dined together on Tuesday night at the Grand Hotel. About fifty gentlemen were present. The chair was taken by Mr. E. Griffiths Hughes, and among others present were Mr. T. Elliott, Mr. G. Heighway, Mr. J. E. Ashton, Mr. W. Twiss, and Mr. T. Harker.—After the loyal toasts, the chairman proposed the toast of the evening, "To the pleasant memory of the Manchester Royal Jubilee Exhibition." He said he had no doubt whatever that for many years the Exhibition would prove not only the subject of pleasant conversation and reminiscence, but of reference whenever matters connected with the progress of the manufacturing industries, of science, and of art were discussed. Nor would the many pleasant personal incidents of the Exhibition be readily forgotten. The conduct of the crowds of visitors showed that the people could be trusted in every way when they were afforded the opportunity of rational and intellectual enjoyment. So much had been written about the Exhibition that the exhibitors could well afford to be satisfied, and to rest quietly and joyfully under the praises so lavishly and, he might be permitted to say, so justly poured upon them. It was not their place at the crowning moment of success to make comparisons with other exhibitions which, it might be, deserved a more triumphant termination. Let them as Manchester men be satisfied with the praises and eulogiums of the world. Let them say God-speed to those who had striven for success, and let them give their sympathy to those who had failed. He thought it must have been noticeable to every visitor to the Exhibition how Lancashire it was in its character—except, of course, in the picture galleries and in the Irish section. He was not going to criticise the different sections, but he would like to say that he was a little disappointed with the way in which the chemical exhibits were set out. The attention of the general spectator was not, he thought, sufficiently attracted to this section. This, however, was a small matter, and need not interfere with their drinking in all sincerity to the pleasant memory of the Exhibition.—Mr. G. Heighway proposed "The Visitors," a toast which was responded to by Mr. J. Farrell and Mr. Smith (of Derbyshire and Smith).—*Manchester Guardian.*

GAS-TAR AND ITS USES.

IX.

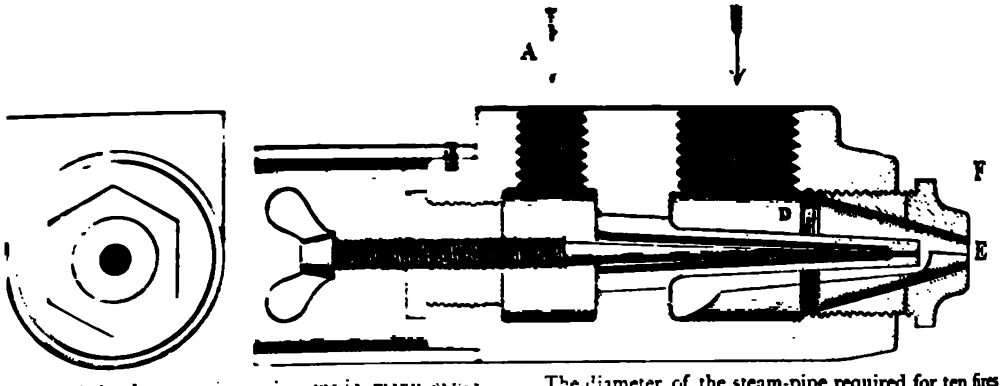
M. ZUBR, engineer of the Belvédère Gasworks at Vienna, has stated very clearly in the *Journal de l'eclairage au gaz* his experiences of the use of gas-tar in heating steam boilers. He says: The value of tar has much decreased in these later years. This is due to the gradual extension of gasworks, and to the recovery of the by-products from coke-ovens, which alone have furnished last year one-third of the whole production of gas-tar.

Tar producers find therefore the necessity of adopting other means of disposing of it in order to obtain a better price and to maintain a better level between supply and demand, so as to avoid in future so great a depreciation of this product, and

[illegible]

[illegible] for each furnace was not [illegible] was taken to a reservoir some [illegible] ten feet above the level of the [illegible] reservoir or tank, the tar is [illegible] free it from the small quantity of [illegible] with which it is usually mixed. The pre- [illegible] separating all traces of ammoniacal [illegible] before it reaches the burner is indispensable [illegible] results. In order also to free the tar from [illegible] which it contains, such as the coke débris [illegible] substances, generally it is made to [illegible] made of a perforated plate, the holes of [illegible] than one twenty-fifth of an inch in [illegible] in a suitable case or box, giving as [illegible] and so arranged that when it shows [illegible] a steam-jet can be applied to blow it [illegible]

[illegible] pipe for the tar has a diameter of 2in., [illegible] fifteen retort furnaces and one steam boiler. [illegible] to work properly to cover these [illegible] with some non-conducting material. In [illegible] against any stoppage in the flow of tar, it is [illegible] the 2in. pipes with another but smaller [illegible] the extreme end of the pipes, so that they may [illegible] alternately. The distributing pipes connected [illegible] burners need only be ½in. in diameter. It is well [illegible] the temperature of the tar always at one thing, say [illegible] which may be readily accomplished by the [illegible] of a steam coil in the tar reservoir. The tar should [illegible] heated above this, as a higher temperature would be liable to expel the lighter oils, which would in such case cause danger and loss.



[illegible] of the Vienna Gasworks, made many experi- [illegible] pulveriser, and obtained very encouraging [illegible] The small apparatus invented by him not only [illegible] the burning of tar, but also for heating by means [illegible] and other sources of liquid fuel.

[illegible] burner the tar enters at A, and penetrates the cone [illegible] concentrically in the exterior chamber, terminated [illegible] receiving a current of steam, or of air, heated [illegible] pressure. The cone D contains a needle, which [illegible] regulator to the flow of tar, which can be enlarged [illegible] at will. The moveable nozzle F permits of varia- [illegible] annular space between the cone and the exterior [illegible] according to the pressure employed. If steam is [illegible] about 7lb. per square inch, the nozzle F is fixed [illegible] annular space of about one twenty-fifth of an [illegible] on the contrary, air, at a pressure of 1½lb. [illegible] employed, the annular space must be [illegible] ures two-fifths of an inch. In estab- [illegible] found that the tar was just as well [illegible] as in the other. If the burner is [illegible] it is necessary to set the nozzle [illegible] furnace, in order to be able to [illegible] of burnt tar which are sure to [illegible]

[illegible] lon of the installation at the [illegible] of fire and for local diverse

The diameter of the steam-pipe required for ten fires need only be 1in. in diameter, and the branches connecting each burner ½in. when worked with steam, and 1in. when it is worked with air; the drier the steam is the better are the results.

The results obtained are generally better when superheated air is employed than when steam is used, and in small gasworks it is found much easier to introduce a gas engine to drive a fan than to set up a steam boiler to supply the burner.

(To be continued.)

BOUNTIES IN THE SUGAR TRADE.

THE following letter upon this subject has been sent to the Liverpool *Journal of Commerce*:—

Sir,—Owing to the bounty system prices of sugar have fallen in four years 40 per cent., and according to an official German organ the amounts granted by Continenal Governments are as follows:—Germany, £1,886,690; France, £3,280,000; Austria, £1,036,667; Belgium, £813,000; Holland, £309,000; total amount, £7,326,012. Such is the sum practically given away in support of an industry that would fail without artificial assistance. It will be noted that Russia is not included in the above estimate, because at p

sent she is not giving a bounty; nevertheless it may be computed that altogether the amount of subsidy granted is equal to one-fourth of the total value of sugar exported. From a blue-book we extract the following report of the proceedings of the Colonial Conference, held in London on the 29th April last, for the consideration of the bounties in relation to our colonies:—"The president of the conference then read the conclusions of a committee of the House of Commons who were appointed to consider the question, and who reported on the 4th of August, 1880:—(1) That the effect of the system of bounties on the exportation of sugar, raw and refined, now in force in various foreign countries, has been injurious to both our home and colonial sugar industries. (2) That the effect has been to practically extinguish the loaf sugar refining trade. (3) That the development of the sugar-growing industry of our colonies has been checked, and their future prosperity endangered. (4) That it is expedient that immediate steps be taken to obtain such an alteration in the present systems as will stop the granting of bounties on sugars, both raw and refined. (5) That the most effectual mode of securing this result is manufacturing and refining under Excise supervision." It was also recommended that in the negotiation of new treaties, her Majesty's Government should take into consideration the propriety of stipulating for such liberty of action as will enable them in the last resort to impose a countervailing duty. Such was recommended as far back as 1880. Is not "the last resort" becoming necessary? Mr. Tinne then said that he thought little good would be done unless this country takes the power to impose a countervailing duty. Mr. Tinne also pointed out to Lord Derby that the whole of our capital is invested in this enormously expensive machinery, and as Lord Derby recognised, if you give the quietus to the sugar industry we cannot transfer our capital, it is wiped out, and extinguished. Since then prices have fallen to a great extent, and such words are doubly true at the present crisis. Not only has English industry suffered, but beet growers as well; for beet, which was worth 27s. per cwt. in 1879, is at present only worth 11s. 10½d. per cwt.; whilst not very long since it fell as low as 10s. The total known sugar production of the world is about 5,000,000 tons; of this quantity about one-half, 2,500,000 tons, is beet, and of this quantity Russia produces about 500,000 tons, leaving about 2,000,000 tons as the production of the rest of Europe. Now we have enumerated the causes of the depression, we will consider a remedy, in fact, the only possible remedy, and that is abolition of the bounties; failing that, countervailing duty. It appears to us that one of the most particular features in the ventilation of this giant wrong is the lack of contravention. Those most interested in the perpetration of this injustice are chiefly dumb, or at best haltingly apologetic, for they know that when at length public opinion is fully awake and educated to the knowledge of the various bearings this Continental iniquity has, on British industry generally, then will justice be done and a panacea found for the depression unfairly endured. As it is so improbable that the bounties will be abolished voluntarily, the only possible remedy is a countervailing duty. And why not? It is advanced that the consumer must have cheap sugar. Cheap, at the expense of an interest which has served Britain well and faithfully in the past. Cheap, that tens of thousands of pounds of British capital sunk in her colonies and dependencies, in plant, in land, in labour, and in shipping, may be made of none effect and forced out of existence. Cheap, that the French and the German manufacturer may enjoy an affluence (one firm in France makes £400,000 per annum) derived both from a protective and fiscal arrangement in their own country. An ignorant fetish worship of the principle of free-trade on the part of the British consumer. And for the present the British consumer revels in cheap sugar (nevertheless the consumption is not abnormally enhanced), but one looks into the future, when the time will arrive when the nation will look for its own sugar industry, and find it has died of neglect, and the source of supply—foreign alone. What will be the price to the consumer of foreign manufactured saccharine when the whip-hand belongs to the German and the Frenchman? And who shall say that the British refining interest, the British Colonial interest, has no right to exist, even under this principle also. We say that the consumer had better pay (¾d.) three farthings (or less) for the benefit of an industry in which the livelihood of so many of his countrymen is involved than mortgage the future of his sugar supply to the German, Frenchman, and the Yankee, whose avowed aim is the destruction of Britain and her commerce. Now, what is the attitude of the Government towards this important question? Both Liberal and Conservative Governments have vied with each other to obtain the abolition of these bounties, and would undoubtedly have been successful in obtaining an International Convention effecting this object if they had consented to a penal clause similar to that which had been accepted, without question, in the convention entered into by Great Britain, France, Holland, and Belgium in 1864. By this clause the principle of a duty to countervail a bounty was admitted. The Marquis of Salisbury, in his speech to a workmen's deputation at the Foreign Office on 22nd July, 1887, said: "I ask you to be content with this assurance, which I give you with the greatest sincerity, that I regard this matter as one of the greatest moment, and no exertion shall be wanting on our part to bring about such an end as you desire. I was very much struck in listening to speaker after speaker with the fact that, although they spoke with a clear appreciation and discernment of the gravity of the evil, they stopped short when the moment came to suggest the nature of the remedy.

Now, what I want you to consider is this, you are dealing with an adversary who is doing you wrong. If a man hits you, you have two ways of dealing with him. You may exhort him, and point out to him the extreme imprudence and wickedness to himself of hitting you as he is doing; or if you think that mode of action is not likely to lead to a satisfactory and sufficient result, you may act to him as he is acting to you. That is the whole philosphy of this question." If the sugar question were the sole bitter cry heard in the perturbed atmosphere of the day; if the British sugar industries' wrong were the only one involved in the fiscal remedy urged herewith, still it would be urged vehemently, for the question presses—presses hard on the attention of those who are suffering unjustly, and the appeal is made to Britain's ancient love of fair-play, and no single phase of our national existence begs harder perforce for a hearing than the sugar industry of Great Britain and her colonies. If the countervailing duty be not imposed—if the bounties be not abolished, it will not be long before the few remaining British refineries close their doors and their men be added to the great army of the unemployed. Such is the inevitable contingency. Beet will then be master of the situation, prices will rise, and Continental Governments will have been successful in destroying one of the most important branches of British industry. Public opinion is awakening, demonstrations show the workmen's mind, and the Government will soon be compelled to take active proceedings instead of its present passive attitude. The only remedy, we say, is a countervailing duty.

THE GERMAN EXPLOSIVES INDUSTRY.—The capital which has been invested in the German explosives industry amounts, according to *Kuhlow's German Trade Review*, to about 25,000,000 mks. The German factories produce yearly about 120,000 ctr. of explosives, which represent a value of 10,000,000 to 12,000,000 mks. From 1,200 to 1,500 operatives are employed in these factories at high wages. The total production of the German explosives industry amounts to treble the native consumption. Two-thirds of the production must therefore be thrown on the export market. It must be attributed to the low prices in Germany that most of the factories are profitably engaged. Owing, however, to competition both at home and abroad, the manufacturers have lately been expressing dissatisfaction at the state of the trade. They propose as a protection for the native industry that the transport of no explosive containing nitro-glycerine should be permitted in Germany, unless a chemist, responsible to the German authorities, makes an attestation that the goods are manufactured and packed in exact accordance with German regulations.

SPECIAL NOTICE.

THE favour already accorded to **The Chemical Trade Journal** is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, **the Organ** of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

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As an **advertising medium** *The Chemical Trade Journal* occupies quite a unique position, it being the **only weekly Journal** exclusively devoted to the commercial aspect of chemistry and cognate industries. The Journal circulates amongst

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It will thus be seen that *The Chemical Trade Journal* offers unusual facilities for bringing trade announcements under the notice of [illegible] important class of buyers, and when it [illegible] tariff for advertisements is not an expensive [illegible] this department of the Journal will be [illegible] seek to extend their business by [illegible] nineteenth century enterprise and [illegible] **rtising.**

Correspondence.

ANSWERS TO CORRESPONDENTS.

Our correspondence has now increased so largely that we cannot continue to reply to all through the post.

J. M.—Thanks for your information. We shall be pleased to be kept posted up in what transpires.

S. L.—The contract runs out in 1890. It is, we believe, on the sliding scale.

J. B.—The liquor is very injurious to vegetation, and if discharged into a fishing stream will most assuredly kill all the fish.

H. S.—Twenty parts of the salt to one hundred parts of water is quite strong enough for the purpose you mention.

T. H. D.—The salt is run to waste, and if you are near a works producing it, you may be able to procure it cheaply. It is 22° Tw., and a fairly pure solution.

O. S.—If you can subsist on bread and cheese, the post you name would perhaps find it for you; but such assistantships can only be taken by those whose parents can afford to keep them, or who have money of their own.

D. D. S.—We do not think it possible to recover the waste dyestuffs as such; but send us some of the recovered colour and we will tell you what we think of it.

S. H.—The almanac will only be sent to subscribers and to a few special names, but the New Year's number will be sent to every chemical manufacturer throughout the entire world.

*** *We do not hold ourselves responsible for the views expressed by our correspondents.*

THE SAPONIFICATION OF FATS AND OILS.

To the Editor of the Chemical Trade Journal.

Sir,—In the saponification of fats and oils by means of alcoholic potash, I have hitherto found it extremely difficult to procure alcohol which would not turn brown when the potash was dissolved in it. Of course the colour in itself is not much of a drawback to the use of such a solution; but with alcohol that turns brown there appears to be formed some peculiar resinous compound, which at times sticks so completely to the whole surface of the filter as to entirely stop filtration, and not unfrequently a day is taken in getting a litre to pass through.

I have now, however, completely overcome this difficulty by using pure methyl alcohol obtained from Messrs. Fassitt and Co. It makes a perfectly clear solution, and gives a creamy white cake of fatty acids, whereas ordinary alcohol gives a brownish and slimy fat, almost always sticking to the filter. In working with this pure methyl alcohol a filtration does not take more than an hour.—I am, etc.,

J. CARTER BELL, A.R.S.M.

TEMPERATURE OF THE BUNSEN FLAME.

To the Editor of the Chemical Trade Journal.

Sir,—In the article on "Water-gas" in your last number (page 220), it is stated that "it is well known that a platinum wire cannot be melted in the Bunsen flame."

This is not correct, as I have myself more than once melted in the Bunsen flame a platinum wire, forming a "bead" of platinum at the fused end. It requires a very nicely regulated flame of course, and the end of the wire, which must not be too thick, must be inserted at the right part of the flame. I feel sure that other experimenters must have observed this fact.—I am, etc.,

HARRY GRIMSHAW.

A YOUNG "FARADAY" DAMAGED.—While a boy, named Graham, was experimenting with some chemicals, at his residence in Charlotte-street, Dublin, last week, an explosion occurred. The windows of the house were blown out, and the building itself was much damaged. Graham was removed to hospital, where it was found he had received serious injuries

'HE RHINE FALLS AT SCHAFFHAUSEN.

ITORS to the Rhine are well acquainted with the Rhine situated at Schaffhausen, these forming the largest ct in Europe. Some twenty miles below the point it issues from the Lake of Constance, the Rhine, with th of 350ft. and an average depth of about 21ft., plunges a barrier of rocks varying in height from 45ft. on the bank to about 60ft. on the left. Including the rapids tal fall within a distance of a little over a third of a is estimated at 150ft. The volume of water passing he falls per second varies from a minimum of 118 cubic s in February to a maximum of 502 cubic metres in when in consequence of the melting of the snows in the tains and the rise in all the tributary streams and brooks, hine reaches its highest point. In this practical age of tions and progress very few will be surprised to hear an application has been made for a concession to utilise magnificent falls for the manufacture of aluminium, the of which, with numerous illustrations and maps, has recently told by one of the American consuls. The cants are Messrs. J. G. Nethers, Sons, and Co., iron-ers at Schaffhausen, who ask for the privilege of con-ing a dam from Laufen Mill to the railroad bridges, a h sufficient to furnish them with a volume of 75 cubic s per second. If this is granted they propose to estab-works for the manufacture of aluminium, furnishing oyment at first to 500 workmen, and later to double that ber. They estimate the water-power necessary to carry eir works at an equivalent of 1,500-horse power, and it with their application the necessary maps, plans, and ings. They further announce that a company with a al of 12,000,000 francs (about £480,000) is prepared to uct the enterprise, and they offer all reasonable antees against any marring or defacement of the natural ties of the falls. The proposition is being met with a g opposition, this being led by the hotel-keepers, men influence in Switzerland, and many others who are ndent on the tourist business. Their business they say ld suffer disastrously, and all over the Rhine district getic endeavours are being made to get the application sed.

Legal.

E ALBO-CARBON LIGHT CO. v. J. KIDD & CO.

)N Monday, November 14th, an action was brought before Justice Kekewich, sitting at the Royal Courts of Justice in ndon, to restrain the infringement of a patent taken out 878 by Messrs. Livesey and Kidd for improvements in the duction of combustible gas and in the enrichment thereof illuminating purposes, and apparatus for the same. The ntiff company were the assignees of the patent whereby inventors obtained protection for the use of solid naph-line for the purposes of enriching combustible gas by sing the gas through a vessel filled with the naphthaline, ir claim being subsequently reduced by disclaimer to the of solid naphthaline prepared in the form of sticks, rods, pellets for the enrichment of gas. The questions at issue this trial were the novelty and subject-matter of the nted invention.

he Attorney-General, Mr. Moulton, Q.C., and Mr. R. Wenn appeared for the plaintiffs, and Mr. Aston, Q.C., Mr. E. W. Byrne for the defendants.

lis Lordship, after hearing the evidence of Mr. Imray, James Livesey, Dr. Hopkinson, and others who were d in support of the plaintiffs' case, gave judgment for the ndants. He said that the only invention which the ntees could claim would be the application of solid thaline in the form of sticks or pellets, but, according to laintiffs' own evidence it was immaterial in what form s used, and, it was so clear that naphthaline in the form was well-known long before 1878. The conclusion was the patentees had taken a known article and applied it to a known purpose, and the action must fail on the question of subject-matter.

Costs were awarded on the higher scale, but, on the plaintiffs' undertaking to prosecute an appeal, execution was stayed.

Trade Notes.

THE LUCIGEN LIGHT IN SPAIN.—We notice a considerable shipment of "Lucigen" oil from Glasgow on November 4th, to Huelva, by the s.s. *Iberia*. It seems that this light is making good headway in Spain, and it is surprising to us that tar distillers have not as a body made an effort to push these lights, in order to secure a permanent outlet for their creosote.

NOT INFALLIBLE AFTER ALL.—Our Sheffield correspondent writes us, that owing to serious difficulties which have arisen in the manufacture of gas in that town, the Board of Directors have called in the services of Sir Henry Roscoe to advise them, and two hundred guineas is mentioned as the fee appertaining to the consultation. We always inferred the Sheffield Gas Company to be infallible, they refused to join the Sulphate of Ammonia and other associations on the ground "that they never joined any association," and it is somewhat ridiculous after being in existence for so many years, that they are obliged to call in a member of parliament and an ex-professor of chemistry to show them how to make gas properly. We understood they possessed a key to every cabinet of magic and mystery, and shall watch with great interest the process of this laborious research.

* * * *

No, John Thomas, you cannot squeeze the lemon to dryness without getting a pip or two in the juice, neither can you work all the goodness out of your tar without getting some of the naphthalene.

RIO TINTO BONDS.—The Rio Tinto Company notify that at the 7th half-yearly drawing of their second 5 per cent. bonds, to be held on the first proximo, bonds amounting to £8,480 will be drawn, to be paid off at par on January 2nd, 1888.

COLLAPSE OF AN OLD FIRM.—The London *Standard* states:—"The bills of David Storer and Sons, paint and colour manufacturers, of London, Liverpool, and Glasgow, have been, for some days past, returned by their bankers. The firm is a very old one, dating from somewhere in last century, and at one time held a first-class position."

A GERMAN OPINION OF ENGLISH SCIENTISTS:—

> "Blow your own trumpets my brethren; for he that bloweth not his own trumpet, the same shall not be blown with a muchness."—*The Nasby Papers.*

The above 'text' of one of the 'Nasby' sermons may not be inappropriately applied to Professor Störk's recent criticism of the treatment of the German Crown Prince. The modesty of the speaker will no doubt commend itself to those unpatriotic professors and public men, who to use the words of our correspondent in last week's issue, "make use of their high position to champion the cause of other countries against their own." The following are Professor Störk's remarks:—"In his case, however, the treatment has been a false one. Germany excels the whole world in science, and England does not stand as high as Germany in surgery. Gérard, Bergmann, and all the others said the treatment was a false one. An English physician was called in, and he took the patient with him, yet every doctor knows that the locality has nothing to do with it. Cancer thrives in Berlin and in London just the same as in Baveno and San Remo. and in good and in bad air. It is absurd to contend that cancer is better operated on in Brighton than elsewhere, and it is inconceivable why the patient had a man attached to him who insisted upon travelling about. The removal from one place to the other was the grossest blunder in the world. I cannot say whether a radical operation would now succeed. I believe that it should have been performed long ago, and that it would then certainly have succeeded."

[illegible]—The Kennall Vale G[illegible] the scene of an [illegible] age and loss of life. [illegible] called the p[illegible] by hydraulic p[illegible] [illegible] large [illegible] the ceiling a[illegible] [illegible] the neighbourhoo[illegible] [illegible] It [illegible] about the press-ho[illegible] [illegible] William Du[illegible] [illegible] from the house t[illegible] [illegible] was in cha[illegible] [illegible] Parry w[illegible] [illegible] and at [illegible] are entert[illegible] [illegible] was dis[illegible] [illegible] having been bl[illegible] [illegible] thirty yards from the building.

[illegible]—It is being sold as a sub[illegible] [illegible] of late has been largely used on the [illegible] [illegible] and other [illegible] [illegible] "Victoria yellow," a [illegible] [illegible] the class of aromatic c[illegible] [illegible] Weyl has just found this [illegible] to [illegible] a comparatively small dose being suffici[illegible] [illegible] in a rabbit, and then death.

THE SUGAR BOUNTIES CONFERENCE.—The Pr[illegible] [illegible] to state that Baron Henry D[illegible] [illegible] Parliamentary Secretary of the Board of Tr[illegible] [illegible] Kennedy, C.B., of the Foreign Office; and [illegible] of the Customs, have been appointed Br[illegible] [illegible] at the International Conference on Sugar [illegible] meet at the Foreign Office on the 24th in[illegible] [illegible] Wormsley will preside over the conference.

THE AUSTRIAN SUGAR BOUNTIES.—The ne[illegible] [illegible] which has been brought forward in t[illegible] [illegible] of the Austrian Reichsrath provides for a [illegible] of 11[illegible] per kilogramme, and for the paym[illegible] [illegible] of 1fl. 50k. on sugar showing a polar[illegible] [illegible] per cent., of 1fl. 60k. on sugar the polar[illegible] [illegible] below 99½ and between 99½-93 per cen[illegible] [illegible] on sugar showing a minimum polarisation [illegible] The official registration of the stock [illegible] the country will be effected within three days fro[illegible] 1st, 1888, the date on which the bill will become la[illegible]

A NEW USE FOR BISULPHIDE OF CARBON.—A [illegible] "rabbit annihilator" has recently been made in Vic[illegible] most satisfactory results. The machine weighs 26lb [illegible] carried by a couple of handles. It consists of a r[illegible] in front of which is a tin receptacle. On a couple o[illegible] rollers an endless web of woollen material is made [illegible] while immersed in bisulphide of carbon placed in t[illegible] tacle, which is made airtight. At the front of this [illegible] a nozzle is placed, to which a piece of indiarubber [illegible] attached, the end of which is pushed into the burro[illegible] principle of the machine is that the blast from th[illegible] passing over the endless web saturated with the liqu[illegible] the vapour through the indiarubber tubing into the [illegible] The machine was applied to natural burrows, and th[illegible] were afterwards taken out dead at a depth of 12ft [illegible] one instance at a depth of 30ft.

GAS EXPLOSION.—An explosion of gas has occur[illegible] residence of Mr. Crookes, the proprietor of the [illegible] at Kensington Park-gardens, London, doi[illegible] damage to the lower part of the house, and forcing [illegible] five feet of the pavement. No one was injured.

HOW EASILY ARE PAYING MINES FINANCE[illegible] Mexican Copper Company Limited has been form[illegible] capital of £250,000, for the purpose of acquiring the [illegible] Copper Mines, in the State of Michoacan, Mexi[illegible] property covers 400,000 square yards, and contains [illegible] belt of copper-bearing strata 500 feet in width. [illegible] will be offered to the public, the capital having been subscribed.

[illegible] magistrates recently [illegible] working during [illegible] were being [illegible] of whose testing [illegible] and the [illegible] this ex[illegible] the summons [illegible] Office might

RISE IN THE VALUE OF COPPER.—The rise in the price of copper continues, and one of the chief authorities in the trade informs us that it is years since there was so keen a demand, and still longer since the market was so excited. There have been sales locally to-day of tough copper at a little over £50—offers previously of £49 15s. having been refused. This is a rise of at least £7 per ton within ten days or so. It is also noticeable that the rise in the price of the shares in local copper companies has also continued. Previously the price of these had been depressed for a considerable time.

STOPPAGE OF TIN-PLATE WORKS.—From Cardiff it is reported that, in consequence of the increasing price of block tin and the continued depression in the price of tin-plates, Mr. Gilbertson, of the Pontardawe Tin-plate Works, has stopped two of the mills.

A NEW MAGNESIUM LAMP.—M. F. Leclercq, of Paris, says *Industries*, is about to bring out a new magnesium lamp, which is intended to replace the cumbersome and uncertain lamp hitherto in use. In the old lamp there were two magnesium tapes fed by clockwork, which had to be rewound at frequent intervals. In the new arrangement there is only one tape, and it is claimed that the lamp will burn without adjustment for twenty-seven hours. Great improvements have also been made in the manufacture of magnesium, by which the cost of production has been considerably reduced—a firm in Antwerp is now selling magnesium at the rate of 1s. 10d. per oz.

INDIAN PETROLEUM.—Orders have been issued sanctioning deep borings, up to 1,300 ft., in India, to test the full capacity of the petroleum oil-fields near Sibi. All the necessary machinery is now on the spot, and the question of the capacities of the supply should be soon put at rest.

FIRE AT A GASWORKS.—About a quarter to five o'clock on the 6th inst., an outbreak of fire occurred in Meadow-lane Gasworks, Leeds. A pipe connected with the testing apparatus got overheated to such a degree, that the woodwork in a range of buildings used as offices and testing rooms, became ignited, and burned through the roof and part of a partition. There is a very great danger in leaving burners alight in laboratories without an attendant, unless the burner is connected with lead piping in place of the usual rubber tube.

FRAUDULENT TRADE STAMPS.—A Glasgow firm has received the following letter from Düsseldorf, Germany. It is of such a remarkable character that they think its contents ought to be made public, although it is marked "strictly private":—"Düsseldorf, November 14th, 1887. Dear sirs,—Will you kindly inform me whether you are buyers of Swedish steel bars for the India or China markets? There is now made in Germany a quality of steel bars, stamped and all with Swedish brands, which to all practical purpose is equal to the real article. If you like to try the quality I can send you some samples, and if you decided to buy some afterwards you need not get the works to stamp any brand which you may decide upon putting on. This you can get done after the bars have left the works, or the works will do this for you. This is strictly private, and I shall be glad if you will kindly treat it as such. Only some people I know are making these days enormous profits out of this."

THE AMERICAN STANDARD OIL COMPANY.—This is how Henry Ward Beecher in a recent sermon referred to the Standard Oil Company:—"That Company is as imperious as all the Egyptian pyramids piled one upon the other, and with Pharaoh on top of all. It is the most gigantic monopoly on the earth, and it is not the less cruel and dangerous because one of the leading men in it is a prominent member of a Baptist church in Brooklyn."

THE EXPLOSION AT BRIDGWATER.—Colonel Ford, one of Her Majesty's inspectors of explosives, has paid a visit of inspection to Bridgwater in connection with the recent explosion of gunpowder in that town, and reports that the retail dealers are in the habit of weighing out the powder from quarter barrels of 25lb. each. The maximum quantity allowed by the Explosives Act being 1lb. only. It has been resolved to prosecute the two injured men, who are still at the infirmary.

PETROLEUM AS FUEL FOR AN IRONCLAD.—The Russian Admiralty has decided upon burning petroleum as fuel on board the Russian ironclad Tchesmé, now being finished at Sebastopol, and has ordered the boilers of the vessel to be fitted with apparatus for this purpose. This is the first instance of an ironclad burning petroleum as fuel. The Tchesmé was, it will be remembered, launched last year by the Czar personally, and is one of the series of first-class battle ships about to be added to the Russian Black Sea navy. The vessel has a displacement of 10,000 tons, and steel armour 20in. in thickness.

PROPOSED NEW GASWORKS AT CLECKHEATON.—The Cleckheaton Local Board, having made an application for powers to borrow the sum of £10,000 for gasworks purposes, it has been decided that a local inquiry be held on the 30th inst. by two of the Local Government Board's inspectors. Some opposition to the Board's scheme is more than probable as regards the proposed site of the new gasworks from several gentlemen whose residences are within a short distance from the site in question, and already a meeting has been held for the purpose of organising the opposition.

ONE MAN'S MEAT ANOTHER MAN'S POISON.—The London Gas Companies, writes our correspondent, are making a good thing out of the fogs which have set in so heavily in the metropolis. The *Gas World* states that during the twenty-four hours ending at six o'clock on Thursday morning last week, the quantity of gas sent into the area of the Gas Light and Coke Company's supply, was not less than 103,664,000 cubic feet, or 35,000,000 in excess of the quantity supplied on the same day of last year. The value of the excess put into money sterling is £5,250. Many towns in the United Kingdom having a population of from ten to twelve thousand do not use more gas in a year than 35,000,000 cubic feet.

THE WEARDALE LEAD COMPANY.—The report of the directors of this company for the year ending June 30, states that the revenue account, after payment of debenture interest, shows a nett profit which, with £476 brought forward, makes a total of £5,465. Deducting the interim dividend of £2,500 paid in May, and £249 9s., the directors remuneration for the year, the directors recommend a further dividend of 1s. per share, making a total distribution for the year of 2s. per share, or 8 per cent. per annum, tax free, leaving £215 to be carried forward.

GAS EXPLOSION AT WAKEFIELD.—Last week an alarming gas explosion took place at the residence of Mr. T. K. Sanderson, South-parade, Wakefield. A smell of gas was perceived in the servants' hall, and the under butler, a young man named Slack, got a pair of steps and proceeded to examine a chandelier. He very foolishly struck a match, although warned by the cook not to do so, and the result was an explosion. The windows of the room, both glass and woodwork, were shattered, the window hangings were rendered worthless, the door was torn off its hinges, and not only was the woodwork charred and blistered, but some of the brick walls in the house were damaged. The larder was completely wrecked, the thick glass roof being shivered to atoms. The door was blown off the housekeeper's bedroom, and a large sheet of plate-glass in a door between the dining room and the conservatory was smashed.

SERIOUS ALLEGATION AGAINST A LONDON MERCHANT. At the Birmingham Police Court on the 7th inst., before Messrs. Kynnersley (Stipendiary) and Hill (Deputy Stipendiary), Alfred Davis, thirty, who gave his address as the Swan Hotel, Birmingham, was charged with inciting a man named Price to rob his employers, Messrs. Barouche and Co., wholesale chemical importers, Wellington Passage, Birmingham. The prisoner is well known in the town, and is a partner in the firm of Pronk and Davis, wholesale chemical merchants, of London. The accused, when arrested on Saturday by Detective-inspector Ore, was in possession of the chemicals which it is alleged he incited Price to steal. Mr. Alfred Young appeared for the defence, and Mr. J. Rowlands acted on behalf of the prosecutors. A remand for a week was granted, and, on the application of Mr. Young, prisoner was admitted to bail in one surety of £1,000.

BLAST FURNACES.—According to a summary compiled by a technical journal, there are 877 blast furnaces in the United Kingdom. Of these, there are 471—or considerably more than half—out of blast, and 406 are only at work. In the different districts, South Staffordshire and Wales seem to have the largest number of idle furnaces, whilst in Lancashire and Cumberland there are the largest proportion of operative furnaces. But in the total number of furnaces there are some which are almost obsolete, and are unlikely to be lit-up again. Such a large amount of idle plant, however, bespeaks an enormous loss of capital.

BOILER EXPLOSION AT CRADLEY HEATH.—On the morning of the 18th inst., a boiler explosion, which might have been attended with fatal consequences, took place upon the premises of Mr. W. Foley, ginger-beer manufacturer, of Tibbett's Gardens, Cradley Heath. About nine o'clock the inhabitants of the neighbourhood in which the factory is situated, were greatly alarmed by a loud report, which was followed by a shock. In a short time a large number of people began to flock in the direction from whence the sound proceeded. It appears that the process of manufacturing aerated waters was being carried on as usual, when the men who were at one end of the works were startled by the loud report, which was followed by a crash, and missiles of bricks and masonry were sent flying in all directions. Upon an examination of the premises being made the boiler, which was egg-shaped and lay horizontally, was found to be hurled some distance from its proper seat, with one end blown out. The building was wrecked, a large window was blown out, and a portion of the roof of the building was carried away, the walls also being knocked down. Fortunately the end of the boiler which was blown out went in the opposite direction from where three men were standing, or the affair would have been attended, in all probability, with fatal results. It is stated that the boiler was being worked at a higher pressure than usual, that being the only reason assigned for the explosion.

EXPLOSION AT A DISTILLERY.—By an explosion in the stillroom of Mr. Cossidy's distillery at Monastervan, near Maryborough, Ireland, one man was killed and several others injured, one of whom has since succumbed.

DIAMOND MINING.—It is said, on good authority, that the house of Rothschild has succeeded in effecting an amalgamation of the richest diamond mining companies at Kimberley, in Southern Africa.

TIN TICKETING.—At the Redruth tin ticketing on the 16th inst., prices ranged from £63. 2s. 6d. to £79. 17s. 6d. per ton, the latter price being secured by Wheal Kitty for a parcel of six tons. The amount realised for the 178 tons offered was £13,113.

FREE FROM FUNGUS.—The River Tay is now being netted near Perth by the officials of the Tay Fishery Board to procure ova for the Board's hatcheries. Four casts of the net landed 183 salmon and grilse, and from these 20,000 eggs were obtained. One most satisfactory feature of these nettings this winter is, that all the fish landed were totally free from disease. This is the first winter since the outbreak of the salmon disease on the Tay, six years since, that all the fish landed have been free of the fatal fungus.

THE MANCHESTER SHIP CANAL.—The unemployed should learn that though 20,000 to 30,000 men will ultimately find work on the Manchester Ship Canal, only 2,500 will be engaged on the first section of the canal, in Cheshire, and the bulk of the hands will not be taken on for some months. Three hundred men are now engaged on the necessary preparatory work at Eastham, such as erecting machinery, cutting railways, and marking the canal route. In a short time this section will be in full swing, giving constant employment to over 2,000 men. The rate of wages fixed by the contractor is 4d. per hour during the winter months, when the hours worked daily cannot exceed nine; but in consequence of the increased number worked in the summer the average wages will be about £1 per week. Quite a village of huts is being erected to accommodate the men employed, and Cheshire workhouses are full of men expecting to get on the job.

RESTRICTION OF OUTPUT.—The ironmasters of West Cumberland, at a meeting held at Whitehaven, have unanimously resolved to reduce the output of the district by blowing out a number of furnaces, and also to make a reduction of 10 per cent. in furnace-men's wages.

IMPORTS OF DAIRY PRODUCE.—According to the B Bill of Entry, we imported during October 116,836 cwt. of butter against 130,715 cwt. in the same month of last year, Sweden sending 15,687 cwt. against 8,847 cwt.; Denmark 32,376 cwt., against 21,214 cwt.; Holland 13,287 cwt., against 38,089 cwt.; France 34,328 cwt., against 36,271 cwt.; Canada 8,588 cwt., against 10,796 cwt., and the United States 2,677 cwt., against 8,517 cwt. Of butterine we received 127,470 cwt., against 77,950 cwt., including 114,451 cwt. coming from Holland, as compared with 66,976. The imports of cheese for the month were 170,062 cwt., against 181,227 cwt., including 30,723 cwt. from Holland, as against 32,854 cwt.; Canada 77,754 cwt., against 80,305 cwt.; and the United States 53,217 cwt., against 63,493 cwt. The imports of eggs, particulars of which are always given in great hundreds received, included:—North Russia, 23,722, against 23,385; Denmark 88,948, against 65,296; Germany 327,177, against 203,948; Belgium 132,788, against 172,563; and France 184,132, against 211,908. The total quantity imported during the past month was 763,579, compared with 742,987 for the same month last year.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

THERE has been little of change in this market since last date. Transactions for spot delivery have further slackened, if anything, and forward coverings are also rather lessened in amount. Cream caustic is back to the old figure, having dropped previous week's half-crown gain, and 70/72° white is also rather weaker. Bleaching powder, on the other hand, has been sold for the east coast bleach fields at an advance on the terms obtainable a week before, although the orders have been of small bulk, and for time needs only. Sulphate of ammonia has further gained. One branch of Scotch chemical manufacture, bichromates, is badly off for orders, never more so since the last combined rise in price, consisting of 1d. per lb. each upon bichromate of potash and of soda. Despatch at some bichrome works has dwindled to one-fifth of what it ought to be, and that on a not very extravagant estimate of the figure at which the output should by rights stand. General prices current are:—Soda crystals, 45s. net Tyne; alum, £5, less 2½ °/₀ Glasgow; borax, English refined, £31, and boracic acid, £46 net Glasgow; soda-ash, 48/52°, 1d., less 5 °/₀ Tyne; caustic soda, white, 76°, £9. 5s., 70/72°, £7. 5s., and cream, 60/62°, £6. 2s. 6d. less 2½ °/₀ Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ °/₀ Tyne; saltcake, 21s. 6d. f.o.r. Glasgow; bleaching powder, £8 f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 and 6 °/₀ to Scotch and English respectively; nitrate of soda, 8s. 9d. to 9s.; chlorate of potash, 6d., less 5 °/₀; sulphate of ammonia, £11. 10s. to £11. 17s. 6d. f.o.b. Leith; paraffin scale, hard, 2⅜d., soft, 1¾d. to 2d.; paraffin wax, 120° semi-refined, 3d., remelted, 2d.; paraffin naphtha, 7½d.; burning oil, 5d. to 6d.; lubricating oil, 885°, £6 to £6. 10s.; sulphate of copper, £16 f.o.b. Liverpool. Imports at the western ports for the week include 49,261 bags sugar, 1,277 barrels oil, and 149 packages of scale (petroleum).

THE ALKALI TRADE.

SALTCAKE is still low in price, and the values mentioned in our last issue may be said to hold good for to-day. The Tyne trade is more hopeful than it has been for some months, but why it is so we cannot tell, unless it be the effect produced by considerable sales of bleaching powder over next year at good prices. The breaking-up of the bleaching powder convention is, we believe, only a matter of

time, as the production of bleaching powder from other sources is now much nearer than the Leblanc makers think. Mr. Muspratt is, we hear, over at Salindrès studying the new Pechiney process, as being a producer of magnesium chloride the subject is especially interesting to him; but what is more interesting to the whole of the Leblanc soda makers is the recent development of M. Solvay with respect to the production of hydrochloric acid from calcium chloride, and we have every reason to believe that some fine morning British alkali makers will wake up to find the process an accomplished fact. There are several other rocks ahead; the above may be only the beginning of the end.

Soda-ash, caustic soda, and other heavy chemicals may be said to have remained unchanged, but owing to the "bear" operations of several dealers there is an attempt to lead buyers to believe that prices are still falling.

THE MISCELLANEOUS CHEMICAL MARKET.

ADVANCES in the metal market continue to affect prices of chemicals, and even where the latter are not directly influenced, there is a general tendency towards improvement in values, consequent upon a better inquiry in connection with business for future deliveries, alkali excepted. Sulphate of copper is dearer again. Lead acetates though firm are without change. Bleaching powder is in good demand for prompt delivery at £7. 11s. 3d. to £7. 12s. 6d. per ton, rails Lancashire, and a large amount of business has been done for the ensuing year at £7. 5s. to £7. 7s. 6d. per ton. The price of muriatic acid has been advanced for 1888 to 7d. per carboy at works. Acetates of lime are in better request and firm. Coal-tar products continue in demand at good prices. Crude 30° naphtha is worth 1s. 3d. for spot delivery, solvent coal naphtha 1s. 4d.; anthracene firm. Carbolic acid 34/35° 1s. 2d. per lb.; picric acid 1s. 5d. to 1s. 6d. Muriate of ammonia, £22. per ton is average price for contracts, 1888. Sulphate of ammonia is firm for spot delivery. Lump alum and sulphate of alumina are dull but without change in prices. Acetic acids of all kinds are selling well, but there is room for improvement in prices.

THE TAR PRODUCTS MARKET.

SPECULATORS still endeavour to lead their customers to believe that benzoles are scarce. And so they will be to outsiders so long as one or two firms continue to absorb the whole of the parcels coming on to the market. Buyers from the Continent are, however, still shy, and will not willingly enter the trap which is being so nicely baited for them. 90's benzol may be said to have a value of 3s., and 50/90, 2s. 4d., as these are prices speculators will pay, but the real consumers will not give anything like these prices. Carbolic acid is still firm, and the weakness shown a week ago has now passed away. Anthracene is in good request at current rates, and it will be some time yet before prices will show a tendency to fall. Pitch is still the *bête noir*, and is likely to continue so, owing to the large production and the still increasing stocks at Runcorn.

THE SULPHATE OF AMMONIA MARKET.

BECKTON has raised its price to £11. 17s. 6d., owing to the scarcity of parcels offering on the London market. It is now no secret that a very considerable quantity of sulphate is being used up at home, and for this consumption buyers are having to pay considerably more than Hull prices. The Hull value to-day may be taken as £11. 15s., at which price we have heard of several important sales, but at the same time we know that even on the same day some parcels have only realised £11. 13s. 9d. At Liverpool and Leith £11. 10s. may be taken as the current value for prompt delivery, and we believe sales at this price have been made covering November.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

15540. G. E. DAVIS. For improvements in apparatus for the distillation of ammoniacal fluids. Nov. 14.

15564. A. BOAKE, F. G. A. ROBERTS, A. SHEARER, and W. B. GILES. For an improved manufacture or preparation of antiseptics. November 14.

15587. C. D. ABEL. A communication from W. Roser, of Germany. For improvements in the production of alkaloids. November 14.

15647. G. TALL and W. P. THOMPSON. For improvements in or relating to the separation or manufacture of colouring matter or mordant for dyeing purposes from cottonseed or cottonseed oil. November 15.

15668. W. J. COOPER. For an improved antiseptic or disinfectant. November 15.

15687. J. DIXON. For improvements in the method of, and apparatus for, concentrating and evaporating soda lye. November 16.

15760. W. WEBSTER, jun. For improvements in the electrolytic treatment of sewage and sea water for the production of certain products therefrom, and apparatus therefor. November 17.

15770. J. F. MADOCKS. For the direct steam boiling of acid solutions generally, and the inversion of cane sugar in particular. November 17.

15771. F. CRANE. A communication from W. D. Field, of United States. For improvements in or connected with varnishes. November 17.

15772. F. CRANE. A communication from W. D. Field, of United States. For process for purifying or clarifying resins and gum resins, or solutions of the same. November 17.

15773. F. CRANE. A communication from W. D. Field, of United States. For improvements in the manufacture and composition of varnish. November 17.

COMPLETE SPECIFICATION ACCEPTED.

803. P. M. JUSTICE. A communication from W. V. Shelton, of Turkey. For improvements in the production of alloys or bronzes. January 18, 1887.

Letters Patent have been issued for the following:—

12249. W. S. SQUIRE and S. C. C. CURRIE. For obtaining zinc in a metallic form from alkaline solutions of zinc oxide. September 27, 1886.

12480. F. H. GOSSAGE, T. T. MATHIESON, and J. HAWLICZEK. For improvements in, and apparatus for, the treatment of sulphate of sodium for the manufacture of sulphide of sodium therefrom. October 1, 1886.

12630. W. S. SQUIRE and S. C. C. CURRIE. For obtaining metallic zinc from its ores. October 5, 1886.

14247. J. B. HANNAY. For improvements in the manufacture of sulphuric acid. November 5, 1886.

14468. E. PIOT. For improvements in distilling apparatus, applicable also to the concentration and rectification of alcoholic and other liquids. Nov. 9, 1886.

14618. O. IMRAY. A communication from the Society of Chemical Industry of Basle. For manufacture and treatment of a compound of phenylhydrazine with a new ethylether. November 11, 1886.

The following Specification has been published. (Postage 1d. extra.) 1887.

16656. H. E. NEWTON. Explosives, etc. 8d.

OUR PRICE CURRENT.

[illegible] 117, Portland Street, Manchester.

[illegible] *The prices in different* [illegible]

		£	s.	d.
Acids:—				
.. Acetic 25	per cwt.	0	10	3
.. .. [illegible]	per [illegible]	0	0	[illegible]
.. Acetic 8[illegible] 250	per cwt.	0	11	[illegible]
.. [illegible] 35	per [illegible]	0	0	4½
.. [illegible]	..	0	0	5
.. Muriatic [illegible]	per [illegible]	0	0	7
.. .. [illegible] 32 Tw.	..	0	3	0
.. Nitric, 36 Tw.	per [illegible]	0	0	2½
.. Nitric [illegible]	..	0	0	2½
.. Oxalic [illegible]	..	0	0	4½
.. Sulphuric, fuming 4[illegible]	per ton	12	0	0
.. .. [illegible]	..	4	0	0
.. .. (Pyrites 1[illegible])	..	3	5	0
.. .. [illegible] 168	..	3	17	6
.. .. (.. 150)	..	2	5	0
.. .. (Pyrites 150)	..	1	15	0
.. Tartaric	per lb.	0	1	0½
Arsenic, white (powdered)	per ton	10	12	6
Alum [illegible]	..	4	15	9
Ammonia, 880 [illegible]	per lb.	0	0	3½
.. = 24°	..	0	0	1½
.. Carbonate	..	0	0	3½
.. Muriate	per ton	22	0	0
.. .. [illegible] ammoniac	per cwt.	34	&	32
.. Sulphate (grey, London	per ton	11	15	0
.. .. (grey, Hull)	..	11	15	0
Aniline Oil	per lb.	0	0	9½
.. Salt	..	0	0	8
Antimony	per ton	33	10	0
.. (tartar emetic)	per lb.	0	1	0
Barium Chloride	per ton	7	10	0
.. Carbonate (native)	..	4	10	0
.. Sulphate (native levigated)	..	3	5	0
Bleaching Powder, 35 [illegible]	..	7	12	6
.. Liquor, 7 [illegible]	..	2	12	6
Bisulphide of Carbon	..	12	5	0
COAL TAR DYES:				
Alizarine (artificial) 20 [illegible]	per lb.	0	0	9
Magenta	..	0	3	9
COAL TAR PRODUCTS:				
Anthracene, 30 [illegible] f.o.b. London,	per unit per cwt	0	1	3
Benzol, 90 [illegible]	per gallon	0	3	0
.. 50 [illegible]	..	0	2	4
Carbolic Acid (crystallised 35°)	per lb.	0	1	1½
.. (crude 60°)	per gallon	0	3	10½
Creosote (ordinary)	..	0	0	1½
.. (altered for Incegen light)	..	0	0	2½
Crude Naphtha, 30 [illegible] @ 120° C.	..	0	1	3
Creosote Oils, 22° Tw.	per ton	1	10	0
Pitch, f.o.b. Liverpool or Garston	..	0	11	0
Coke oven Oils (crude)	per gallon	0	0	1½
.. (distilled)	..	0	0	2
[illegible] (bulk bars)	per ton	51	10	0
[illegible] Sulphate	..	10	15	0
[illegible] Oxide (copper scales)	..	43	10	0
[illegible]	per cwt.	1	15	0
[illegible]	per ton	33	0	0
[illegible] (crude)	..	55	0	0
[illegible] (refined)	..	1	13	0
[illegible]	..	0	7	0
[illegible] (billy)	..	1	13	0
[illegible]	..	3	0	0
[illegible]	..	1	2	6
[illegible]	..	1	0	0
[illegible]	..	13	15	0
[illegible]	..	26	10	0
[illegible]	..	19	10	0
[illegible]	..	22	5	0

		£	s.	d.
Lime, Acetate (brown)	per ton	9	15	0
.. .. (grey)	..	13	15	0
Magnesium (ribbon and wire)	per oz.	0	2	6
.. Chloride	per ton	2	7	6
.. Carbonate	per cwt.	1	17	6
.. Hydrate	..	0	10	0
.. Sulphate (Epsom Salts)	per ton	2	10	0
Manganese Sulphate	..	19	10	0
.. Borate	per cwt.	2	5	0
.. Ore, 70 [illegible]	per ton	2	10	0
Methylated Spirit, 60° O.P.	per gallon	0	2	4
Naphtha (Wood) Solvent	..	0	4	0
.. .. Miscible, 60° O.P.	..	0	5	4½
Oils:—Castor	per cwt.	1	4	9
Cotton-seed	per ton	20	10	0
Linseed	..	20	10	0
Lubricating, Scotch, 885°—890°	..	6	10	0
Petroleum, Russian	per gallon	0	0	5½
.. American	..	0	0	6
Silver (metal)	per oz.	0	3	7 11/16
.. Nitrate	..	0	2	8
STARCHES:—				
Sago	per cwt.	0	8	9
Potato (farina)	..	0	10	3
Sodium (metal)	per lb.	0	6	0
.. Carb. (refined Soda-ash) 48 %	per ton	4	17	6
.. .. (Caustic Soda-ash) 48 %	..	3	17	6
.. .. (Carb. Soda-ash) 48 %	..	3	17	6
.. .. (Soda Crystals)	..	2	12	6
.. .. (Crystal Carbonate)	..	5	6	3
.. Chlorate	per lb.	0	0	7½
.. Borate (Borax)	per cwt.	1	9	0
.. Bichromate	per lb.	0	0	3½
.. Hydrate (74 % Caustic Soda)	per ton	8	2	6
.. .. (70 % Caustic Soda)	..	7	2	6
.. .. (60 % Caustic Soda, white)	..	6	2	6
.. .. (60 % Caustic Soda, cream)	..	6	0	0
.. Bicarbonate	..	5	17	6
.. Hyposulphite	..	5	10	0
.. Nitrate (95 %) ex ship Liverpool	per cwt.	0	8	10½
.. Silicate (glass)	per ton	5	10	0
.. .. (liquid, 100° Tw.)	..	4	7	6
.. Sulphate (Salt-cake)	..	1	1	0
.. .. (Glauber's Salts)	..	1	17	6
.. Sulphite	..	5	12	6
Potassium (metal)	per oz.	0	3	10
.. Bichromate	per lb.	0	0	4½
.. Carbonate, 90%	per cwt.	0	17	9
.. Chlorate	per lb.	0	0	6
.. Hydrate (Caustic Potash)	per ton	22	0	0
.. Nitrate (refined)	per cwt.	1	2	0
.. Prussiate Yellow	per lb.	0	0	7½
.. Sulphate, 90 %	per ton	9	15	0
.. Muriate, 80 %	..	8	10	0
Strontium Hydrate, 98 %	..	7	0	0
Sugar, Beet	per cwt.	0	13	6
.. Cane	..	0	19	6
Sulphocyanide of Barium	per lb.	0	0	5½
.. Ammonium	..	0	0	8½
Sulphur (Flowers)	per ton	9	5	0
.. (Roll Brimstone)	..	5	17	6
Superphosphate of Lime (28 %)	..	2	0	0
Tallow	..	23	10	0
Tin (metal)	..	146	0	0
.. Crystals	per lb.	0	0	9
Zinc (Spelter)	per ton	17	5	0
.. Chloride (solution 96° Tw.)	..	5	15	0

: Chemical Trade Journal,

ATURDAY, DECEMBER 3, 1887.

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TO ADVERTISERS.

IAL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

first week of the approaching New Year we shall **SPECIAL NUMBER** of the **Journal.** We pro- ring our first volume to a close with the last Saturday nber, 1887. The issue of January 7th, 1888 (No. 33), mence Volume II. It will be an enlarged special of very general interest. We shall issue along with **le-page** and **Index** for the first volume, together eat and useful **Office Almanac,** suitable for our ers, which is now in course of preparation.

ling our regular subscribers, our New Year's Number ssued to **NOT LESS THAN 10,000 FIRMS AND DUALS,** so that intending advertisers will see at it this issue is worthy of their special attention.

ay explain that in our Publishing Department, we ery carefully compiled lists—in most cases the result l knowledge and information at our command—of n of repute, both at home and in the main trading broad, connected with the various industries whose it is our province to serve. We utilise these lists week, by selecting a number of them in turn, and out free copies of the Journal to those firms who yet become annual subscribers. The result is that ery day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of the New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO,** numbering altogether, as we have stated, not less than **10,000** names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

THE PECHINEY PROCESS.

In our article some time ago upon "The Present Position of the Alkali Manufacture," we ventured to express the opinion that the English alkali trade was not in such a stable position as Mr. Fletcher would have us believe, and as he tried to convince his hearers at the last meeting of the British Association in Manchester; and only a few weeks since we endeavoured to throw a ray of light upon the possible future of the bleaching powder industry of this country, in order that the bleaching powder makers, one and all, might look upon the subject from a new standpoint, and realise in how serious a position they now stand encircled.

Not only are the Leblanc manufacturers threatened with an attack from Solvay's process, wherein chloride of calcium is made to yield the necessary chlorine for the production of bleach, thus opening up a way for the utilisation of those vast quantities of waste material now useless to manufacturers of soda who work by the ammonia process. Not alone are they to be sorely tried by the gradual and almost certain development of the Hermite process, which every day looks more promising and of sure accomplishment; but on Monday next the world of manufacturing chemistry will hear from the lips of Professor Dewar the story of the completion of the Pechiney process. In our short notice of this subject (see *ante* p. 205) we indicated sufficiently clearly, to most minds we hope, that the perfection of the Pechiney process would not be good news for those who were now working the system of chlorine manufacture by means of regenerated manganese mud, as, if successful, Stassfurt—and neither Widnes, nor St. Helens—would probably become the seat of a new industry. If chloride of magnesium can profitably be made to produce chlorine, not only will the Leblanc process be completely snuffed out, but a great revolution having many bearings upon our home industries will be effected.

Bleach at present can be made at a profit, but on the other hand Leblanc soda cannot be produced so cheaply as ammonia soda; in fact, Leblanc soda makers are losing on every ton of alkali they sell, but the large profit on bleach enables them to make both ends meet when they are considered together. What would happen then, should the bleaching powder industry be separated from the soda manufacture? Certainly, only one thing. The makers of Leblanc soda would have to close their establishments, for it is only by the combined manufacture that they are now able to keep on their legs. But what are the conditions necessary to the successful manufacture of bleach from chloride of magnesium? Clearly, cheap chloride of magnesium and cheap fuel. We have the latter, but not the former; while Stassfurt revels in this salt, and M. Pechiney has enough and to spare.

We do not wish to anticipate Professor Dewar in the surprise he has in store for English alkali makers on Monday next, as no doubt the information he will furnish—judging from his connection with the directorate of the Weldon's Processes Company—will be novel and complete; but as it is our wish to give early information relating to new processes of interest to our readers, we may foreshadow some of the points worthy of consideration by manufacturers, and much regret we are not able to do so more fully.

Some time ago we wrote M. Pechiney asking for information, and his reply was a short official communication referring us to the Weldon Processes Company of London. Application to this Company, however, only resulted in the promise that our communication should be laid before the board of directors at the next meeting. We have therefore been compelled to rely upon the information furnished to us by our Marseilles correspondent.

Chloride of magnesium is to some extent a by-product of M. Pechiney, and in applying it to the manufacture of chlorine it is concentrated to that point at which the solution contains six equivalents of water to every equivalent of chloride of magnesium contained therein. It cannot be well concentrated further, as at this point it commences to disengage hydrochloric acid, thus introducing practical difficulties which are not easy to overcome. To this concentrated solution, this practically hex hydrated chloride, sufficient magnesia is added to form the compound or oxychloride, a solid mass which is carefully wrought to secure that no fine particles shall interfere with the free working of the decomposer. In order to prevent this the solidified mass is carefully sifted, and all the fine particles thrown back into the solution for reconcentration and solidification.

The next step in the operation is to heat this hydrated oxychloride to drive off the water; but this operation cannot be performed without the loss of a considerable quantity of free hydrochloric acid, which is practically lost for all purposes of chlorine making. The quantity stated to be lost in this operation is about 10 per cent. of the whole, but in ordinary working it might be more. Ten per cent. is a loss which cannot be neglected, in view of possible developments of other processes, especially as the cost of condensing it will become a standing charge upon the process.

To resume: this now anhydrous oxychloride of magnesium is charged into a decomposer of special construction, which has been previously heated to a very high temperature by means of a gas flame. The decomposer practically consists of a number of vertical chambers about 3in. in width, and about 3ft. wide and 9ft. deep, and it is into these highly heated chambers that the anhydrous oxychloride of magnesium is charged, a current of air passing through the material causes decomposition to take place, hydrochloric acid and air, forming water vapour and free chlorine.

All this is very pretty, from a theoretical point of view, but in practice the decomposition is by no means so complete as it can be represented on paper. About 10 per cent. of the oxychloride of magnesium remains undecomposed, even though the masses in the decomposer have broken up to a fine powder in yielding up their gaseous constituent, and though it cannot be said that this is a loss, yet in connection with another point yet to be described, it is not as satisfactory as if the decomposition was complete in the first instance, and leaves a much larger expenditure of fuel and labour per unit of chlorine than if the magnesia residue was substantially pure magnesium oxide.

Again, the decomposition into chlorine and water of a mixture of hydrochloric acid and air is never anything like complete; we doubt whether, in the presence of so much water vapour it is possible to get more than 60 per cent. of the gas converted, this being even greater than is actually accomplished in the well known Deacon process, taking an average over a long period. In the Pechiney process we are informed that the decomposition does not average more than 50 per cent., and the remaining undecomposed hydrochloric acid has to be condensed and washed from the chlorine before it is fit for the manufacture of bleaching powder. This liquid hydrochloric acid is, however, not wasted; some of the magnesia from the decomposer is dissolved in it, and so in a great measure the undecomposed oxychloride is brought into the [illegible] again, and with it the large quantity of liquid hydrochloric acid, which is forced to undergo the round of changes a second time. This of course means occupation of a second time with work which should have [illegible] first time, and adds to the cost of plant, per [illegible] the labour and fuel, and is not without [illegible]tion and tear and wear accounts.

At the present time we are informed that one complete operation in each decomposer occupies twelve hours, six hours in heating up and six hours in the decomposition, so that only two operations can be performed per day, and this makes the plant very costly and cumbersome.

Now what is the outcome of all this in pounds, shillings, and pence? Perhaps Professor Dewar will be able to tell us. From Marseilles we learn that it takes seven tons of the oxychloride of magnesium to produce a ton of chlorine, and that, taking all in all, the process at present working at Salindres produces bleaching powder exactly at double the cost as the manganese recovery process working at the same place. It has been stated to be the opinion of those well calculated to form a good judgment upon such matters, that the cost might be reduced to about one-and-a-quarter that of the present manganese process, in the first installation, but we have no information beyond this.

If all this can be done at Stassfurt where muriate of magnesia can almost be had for the giving, how can we hope to retain the bleaching powder industry in England without some new process will give a greater yield of bleach per ton of salt decomposed than has been possible hitherto, so that bleach may be made without having to incur a heavy loss on the saltcake or alkali, and the reduction of supplies lead to a substantial enhancement of value.

We have already hinted that a ton of bleach from a ton of salt is possible, but such a statement does not seem strong enough to rouse the manufacturers of bleaching powder from their lethargy, perhaps they will wake up when it is too late, to find their occupation gone.

ANCIENT AND MODERN CHEMISTRY.

At the last opening meeting of the North British branch of the Pharmaceutical Society of Great Britain, Prof. Crum Brown delivered the inaugural sessional address, taking for his subject "Remarks on some chemical theories," he noticed, first, that the more science advanced the more searching were the tests used to prove theories. A theory helped people, because as soon as a theory was stated they saw conclusions derived from it which no previously known facts would lead them to. Upon putting the theory to the proof of these facts, if it was proved the theory was enlarged and extended. But theories got worn out in the light of new knowledge, and had to give place to new ones. There was no means of testing the truth of a theory, but they had what was much better, the means of testing its usefulness. Present chemical theories were only partial, for they applied to only one science. People would not obtain the one complete theory of anything till they had got the complete theory of the whole universe. They were looking for the one principle which underlay all existence. While they could not hope to be able to discover that principle fully, they must travel along the road towards it. He spoke of the views of the Greek philosophers on matter, principally that all kinds of matter were one, and now at the present day a theory had arisen pretty much on the same line of this supposed unity of matter. Stating it very broadly, the principle was that all the properties of an element, physical and chemical, could be deduced by calculation from its atomic weight. Given the atomic weight of an element, and that was all that was required to calculate everything chemical and physical connected with it, and, therefore, about all its compounds. This broad statement indicated the direction the theory would probably take. The theory had been so far proved by the discovery recently of two new metals whose atomic weights and properties had previously been anticipated. Thus it might come to be shown that the only difference between different elements was one of the weight of their atoms. The lecturer spoke next of Aristotle's four elements, or, rather, properties of fire, air, earth, and water. Professor Brown touched on the modification in this view as time went on till the phlogistic theory arose in the time of Boyle. At the rise of modern science any combustible substance was said to possess phlogiston, and when it was burned it was said to lose its phlogiston.

his was the first general chemical theory, and led to the iscovery of many new facts. The theory came to an end rough the observation that after lead was burned the resulting litharge was heavier than the lead had been. The theory f causticity had been disproved by a similar quantitative eans. The importance of oxygen was then revealed, and a ew theory was at once made out of the old one, oxygen king the place of phlogiston. This theory did not last ng. Coming to speak of the present theory, the concatenaon of atoms, he said it had done much good work, and hether it would last long or not remained to be seen. By is theory not only was one atom united to a group of atoms, t it was also united to another individual atom. Since the blication of the theory in 1858 it had been very fruitful. he chemist could now say he wished to produce a substance ith certain qualities, and by previous calculations with this eory as a guide the substance could be produced. They ust look upon the theories as instruments for use, and the ore they were used the faster they were worn out. It was sirable that they should be prepared for a new developent. There could be no doubt as to the direction from hich the new development would sooner or later come in e case of chemistry. Chemistry was a branch of the larger ience of dynamics. Some other branches of that science, ch as physical astronomy and the theory of light, had been far developed as to admit of strict mathematical treatment. his was not yet possible in the case of chemistry; but here d there they could see the beginnings of a change. Just ok at the cases of electrolysis and of dissociation. Both were ginning to attract the attention of the mathematical physit. Chemists should therefore be ready to hunt their own me in their own territory. No modern chemist could any ger afford to be ignorant of general physics, and he also ould have a knowledge of mathematics so as to understand w to treat problems by that art. The time would come en those questions which were now considered purely emical would be capable of being treated mathematically. emists must not leave it to other scientists to handle their jects, they must be able to handle them by modern thods themselves.

GAS-TAR AND ITS USES.

X.

In this connection, and while treating of the use of gas-tar heating purposes by means of a blast of compressed air, we l it necessary to mention Hannay's "Pyrigen" or regenere and radiative oil furnace, as gas engineers should leavour to bring it under the notice of those interested in h things in their immediate neighbourhood.

It is not yet we believe made for large purposes, such as heating furnaces of large size or for firing steam boilers, t has been designed for quickly raising metals of all kinds a white heat, for welding, riveting, shaping, and casting, thout oxidising, sulphuretting, burning, or in any way uring the material.

It is wrought in the first place on the regenerative princi, that is the waste heat which would otherwise escape up e chimney is used to raise the temperature of the air quired to disintegrate the oil, and also of the air used for mbustion. In the second place, as Siemens has conclurely shown, that the impinging of a flame on a solid surface uses dissociation of the gases, and hence slow and inefficient mbustion as well as excessively rapid destruction of the the brick furnace, the new principle of radiative heating s been employed, so that neither the material of the furnace the articles being heated are subjected to the destructive ect of the flame. When intermittent heating is required, e flame can be turned down, so that the consumption of tar very small; and if the damper is closed, the furnace is intained hot and ready for immediate further use, thus iding sudden heating and cooling, which is so destructive the brickwork of furnaces. If required, a "pilot" light is anged along with the burner, so that when the main tap urned off a small flame is kept up *without* waste of oil, from which the main flame is relit at any time by the mere turning of a tap.

This furnace is specially well adapted for heating iron, for making bolts, rivets, and nuts, and has many advantages over the ordinary rivet furnaces. It is stated by the patentee that the cost of tar required for combustion is not one-third that of coal, the iron at the same time being maintained in a pure condition, and is not burned or sulphurised as when coal is employed.

The increasing use of fixed and portable riveting machines in shipbuilding, bridgebuilding, and other engineering operations calls for a systematic and economical method of heating rivets as a matter of the highest importance, and the pyrigen can supply any quantity to the machines at the required temperature. The furnace can be heated ready for use in ten minutes and the temperature kept steady and under perfect control; and further, the pyrigen being extremely portable can be readily shifted about, according to the requirements of the work.

Another useful application of the pyrigen is for heating the iron or steel tyres for shrinking on to the wheels of wagons, railway and ordinary carriages, the labour and expense of the usual methods of heating being superseded at much less cost, as the furnace can be got ready for heating in a few minutes, and the flame turned off when not required.

Angle-iron and plate reheating can also be very effectively conducted with this apparatus, and for boiler-makers and bridgemakers it must be greatly superior to the old furnaces, as by its use the heat can be regulated at will, and the iron kept clean and free from scale. In welding some of the flanches of marine boilers, particularly in such works as fitting the tube plate to the furnace flue, the pyrigen can be applied with great advantage, the burner being so arranged that the flame can be made to play in any direction on the part to be heated, and the iron raised to a welding heat without requiring the movement of any portion of the work.

In cupelling and similar operations this form of furnace is well adapted, and in all metallurgical operations where high temperature and purity of the flame are necessary.

A special form of furnace is manufactured for brassfounders, metal fusions and bullion smelting, and such other operations where it is desirable to surround the object with either an oxidising or a reducing flame. This constitutes a most important advantage over heating by coal, as by merely turning a tap the flame may be changed in an instant from oxidising to reducing, or *vice versa*, while the temperature can be made to rise to a given point and maintained there perfectly steady for any length of time. This absolute steadiness with which any given temperature may be maintained is very valuable in such operations as enamelling, japanning, vulcanising, annealing, etc., all the arrangements being of a very simple nature.

The pyrigen is worked by compressed air, but we believe it can also be worked with steam at high-pressure, where compressed air cannot be conveniently obtained; but in this case the steam is superheated by passing through the flue before reaching the burner. This apparatus burns without either smoke or smell, and as it gives off no irritating gases can be used inside any ordinary engineering establishment. We believe it would well repay every gas engineer to bring this form of furnace before the notice of engineering firms in their locality, as by doing so they will be finding a new use for gas-tar.

LIGHTING BY MEANS OF WATER-GAS.

SINCE the appearance of the last article on water-gas we have received many inquiries asking for more detailed information respecting the same; we feel, therefore, that a few further remarks upon the subject may not be out of place. First, in respect of cost. We believe that for purposes of illumination, 1,000 cubic feet of water-gas will give as much light as a similar quantity of 18 candle coal-gas, and we also believe that even in manufacturing it on a small scale, it will not be found to cost more than 11d. per 1,000 cubic feet.

At the above price, and under such conditions, the system of water-gas illumination commends itself to all millowners and users of large quantities of gas for illuminating purposes. We have been asked whether, in such circumstances as that of a mill at present making its own coal-gas, it would be advisable to pull down the old retorts and put up a water-gas generator instead? In such a case we would rather say: Work your retorts until they want renewing, and instead of renewing, put the money into a new water-gas generator.

One correspondent asks us to compare the Fahnehjelm burner with the Welsbach burner for coal-gas. We cannot; there is no standard to commence with; but we know the Fahnehjelm comb costs about three halfpence, while we have been asked fifteen shillings for a Welsbach fitting. Moreover, a Fahnehjelm comb would not yield any light at all with coal-gas; it must be water-gas. Until electricity comes in cheaply and revolutionises all our ideas of illumination, water-gas must be considered as the intermediate stage of incandescent lighting—the step midway between gas and electricity—and there is but little doubt that even in America, where petroleum refuse is so cheap, illumination by means of the Fahnehjelm burner will soon meet with general approval.

The water-gas flame by itself is absolutely non-luminous, yielding only a flame such as is produced by burning "spirits of wine," and is therefore *per se* absolutely unsuited for purposes of illumination. It is just a question whether it would not pay Scottish gasmakers to produce water-gas from their coke, and to carburet it with intermediate shale oil as they do in America with petroleum refuse, but on a small scale such a process would scarcely be remunerative. The carburetted water-gas made by Strong's, Lowe's, and Dwight's processes is in use in over eighty American cities, including New York, Baltimore, Lancaster, etc., and for many years the water-gas companies have been waging a most bitter battle with existing coal-gas works. There is little doubt that in this warfare the coal-gas works must eventually succumb.

The introduction of water-gas into Europe was principally due to the labours of Mr. G. S. Dwight, who journeyed to Sweden for that purpose, and two generators were erected mainly for the purposes of experiment by a Stockholm company. This same company was the means of erecting generators at Vienna, Paris, and Frankfort on the Maine. In the last place the eminent gas engineer, Herr Schiele, and Dr. Bunte, from Munich, indicated very clearly the rational mode of working water-gas generators. It is, however, satisfactory to know that the first introduction of the Strong stove to metallurgical purposes took place at Birmingham in 1881, where it was used for the first time in welding tubes.

THE BASIC SIEMENS' PROCESS.

At a meeting of the South Staffordshire Iron Steel Works Managers' Institute, Mr. F. W. Harboard, A.R.S.M., read a paper on the "Basic Hearth Process." He said:—"Perhaps there is no district in England where the manufacture of a high-class mild steel is of such vital importance as in South Staffordshire, as all our native pigs being phosphoric we have either to import hematite pig to make steel, or buy the finished steel from other districts, and this no doubt accounts for the great attention which ironmasters in this district have given to all processes brought out during the last fifteen years professing to accomplish this. Amongst these various processes may be mentioned Danks's puddling process, the Purnot furnace, and the Ponsard revolving furnace, all of which have had one thing in common—viz., a basic lining, and in each case this basic material used has been oxide of iron. The basic Siemens' process is a further development of these processes, in which a much more refractory basic body is used as a lining, and it is this which has made it a practical success; and from a chemical standpoint it very closely resembles the old familiar puddling process, only we deal with tons instead of cwts. The operation is carried out in a furnace similar to the one shown in the diagram, and may be capable of holding from eight to fifteen tons, and it is lined with basic material on the bottom completely, and on the sides to a height of six or eight inches above the metal line, and above this the walls may be built up with silica bricks, the basic lining being only necessary where there is actual contact with the metal and slag. The basic material is prepared by calcining at a very high temperature dolomite or magnesian limestone, grinding the calcined stone, mixing it with tar, and either pressing it into bricks, which can be built up in the furnace, or by ramming it into the furnace with red-hot iron rammers. With this exception of the lining, the furnace is in all respects similar to the ordinary Siemens used in working hematite pig, and may be of the old-fashioned type, or the more modern furnace patented by Messrs. Wailes, Riley, and Dick; they both embody the well-known Siemens regenerative principle, the heat from the waste gases being stored up in brickwork chambers, and afterwards used to heat fresh quantities of gas and air before they enter the furnaces. The furnace having been got thoroughly hot, lime or limestone, either with or without oxides of iron, is placed on the bottom of the furnace, and the pig-iron, with or without scrap, is charged into the furnace. The gas and air are then turned on, and in about four hours the charge will be melted. The furnacemen then add more ore or lime, taking samples of the metal from time to time, and judging from the fracture of the metal what additions the bath requires. The oxides of iron, etc., are added until the fracture shows that the phosphorus is reduced to about ·06 or ·05, when the metal is tapped, ferromanganese being added as usual. If we now consider the reactions taking place during the conversion from cast-iron to steel, we shall see how closely they resemble those which take place in puddling; oxide of iron, as in other steel processes being the purifying agent. In the Bessemer process, as you are well aware, large quantities of air are blown through the molten metal, and the first action of the blast is to oxidise part of the iron which it first comes in contact with; and this oxide as it rises through the metal gives up its oxygen to the impurities present, and is again reduced to the metallic state, and thus the oxide of iron acts as a carrier of oxygen to the impurities in the bath. In the Siemens' processes, whether acid or basic, we use oxides of iron as the direct oxidising agents, exactly as is done in the puddling process; and these oxides give up their oxygen, which burns out the impurities in the pig-iron—the iron in the ore, deprived of its oxygen, passing into the bath of metal. In the basic Siemens there is, however, one important point in which it differs from puddling, and that is in the lime lining, and in the considerable additions of lime during the operation. The first reaction in the removal of Phos. is its oxidation by the O. of the iron ore with the formation of an oxide of phosphorus called Phos. Anhy.; but this body being a very unstable sort of individual must either get some one to take care of him or he splits up again into Phos. and O., the former running back into the metal. In the puddling furnace this P_2O_5 unites with the oxides of iron, which hold it, and it is carried away in the slag. But at the intense heat of the Siemens' furnace the oxide of iron is not strong enough to take care of the P_2O_5, and consequently we have to seek for a more powerful ally in lime. The necessity for using lime may be summed up by saying that phosphate of iron is decomposed by molten wrought-iron, while phosphate of lime is not; in other words, phosphate of lime forms a stable phosphate at the temperature of the Siemens' furnace—phosphate of iron does not. It will be seen that there are two active chemical agents used—first, the ore, as an oxidising agent to burn out the impurities; and second, the lime, as a fixing agent to hold these in the slag when they are burnt out. It is important, therefore, to maintain the lime in excess, and the more silicious pig-ore is used, the more lime will be required, as every atom of silica neutralises so much lime, which will render it useless for holding the Phos.; if sufficient lime is not added the lining will also be rapidly worn away, which is a serious matter. With regard to the basic lining itself, it probably takes little or no part in the chemical reactions of the furnace further than giving a non-silicious lining, and probably any neutral body, provided it could withstand the intense heat, would answer the purpose. Chrome iron-ore,

such a neutral body, has been successfully employed Continent, the lime additions being made as usual. cid Siemens, in charging the furnace, no oxides of be placed on the bottom of the furnace, as the bottom sand, silicates of iron would be formed, which would the bottom; but in the basic Siemens a large pro- of the oxides may be charged with the pig and scrap, , if preferred, the oxides can be kept back till the melted. If the cinder ore, etc., is put on when , the metal as it melts trickles down into a bath of oxide, and is practically being puddled while other are melting, so that the greater part of the purifica- one during the melting period. At the works with am connected we usually charge in this way, about of oxides being put on with each charge, lime being the same time. Instead of using red ore or pottery have used almost entirely a flue cinder from our furnaces, which are working with basic slag

As will be seen by analysis, it is almost with best ball-furnace tap, and we have obtained results with it. Any oxides may be used in the provided they are low in silica and tolerably free phur. Amongst others, roll scale, free from sand, ery mine, give good results. In 1886 I placed before and Steel Institute the results of some experiments out at the Patent Shaft, and with one exception a antity of ore only was charged with the pig, and e melting period practically the whole of the Si., 90 of Mn., and 40 per cent. of P. were removed e melting, which is very similar to what occurs in ling furnace. In one experiment we placed a large of ore on the bottom of the furnace with the charge, n melted the bath was found to be practically steel, the phosphorus being about ·05, and the ·000. I at once saw that if this result could be regularly that great economy would result, as there ssibility of finishing the charge in four or five hours of eight; and when we started our own furnace a of experiments were tried in this direction. The iven on the table are of five consecutive casts, and it een by the analysis that they are very nearly ready to melted, and were quite ready about one hour after

On the same table I give analysis of melted taken from three charges worked without any cinder arged with the pig, and as will be seen, the removal comparatively small. We found, however, as a of practice, that we gained nothing by this rapid of the impurities, as, owing to the size of our etc., we were unable to get the bath of metal hot to tap until two or three hours after melting, and es longer. Some steel-makers prefer to add no ith the charge, and I think that the danger of over- is certainly less if the ore, etc., is added after the melted; but provided you could get sufficient heat to in an hour after melting, I think that the economy during melting is obvious, and with care no over- of the metal should occur. Unless the necessary be obtained perhaps the best plan is to put about cinder on with the charge and use the other when The actual amount of cinder and ore used will of ary with the composition of the pig you are working; le it is important to add sufficient to do the work y and rapidly, it is also important not to add too the slag will become too thin and the metal be lised and very wild when teemed into the moulds, iron will also be wasted by a large quantity passing the slag. A finished slag should not contain more per cent. Fe, and there is no great economy in trying e it below 7 or 8 per cent., as it then does its y slowly, and there is some difficulty in getting the s of P. out of the metal. To work the B.S. success- important, as in all other processes, have a suit- ; as although, with great care, it is possible to make lent steel from the commonest ordinary t is impossible to get the men to be necessary as to obtain a formly good without a fairly good pig to start with. Such a pig should contain 2·5 per cent. phosphorus, 1·25 to 1·5 manganese, ·100 or less of sulphur, and not above 1·000 silicon, and I think, with reasonable care, there should be no difficulty in making such a pig in Staffordshire. There is no doubt that a much higher Sulp. than ·100 per cent. can be tolerated, and at the last meeting of the Iron and Steel Institute, Mons. Pourcel said that he could easily reduce sulphur in a bath of metal from ·200 to ·05 by the use of manganese ore in the furnace. We have been making experiments at our works with this ore, and have obtained most promising results; but as prevention is better than cure, and as we are always liable to take up some sulphur from the gas during melting, which has to be got rid of afterwards, ·100 is quite sufficient, and I should never object to a pig myself with half this quantity. A very interesting point in the use of this ore is that, like oxide of iron, it can act as an oxidising agent, and to some extent is reduced to metal manganese and passed into the bath. Some months ago I noticed this reaction of the manganese passing back from the slag into the bath of metal, and have since had it confirmed; and Mr. Wailes tells me that when he started using manganese ore to keep his sulphur down he found at once that it was not necessary to add so much ferro at the end, proving, I think, that some of the manganese from the ore must have passed into the metal. I believe that with proper precaution, by using a poor manganese-ore to work down the charge after it is melted, that the manganese addition might be very largely dispensed with. Another possible development of the use of manganese ore in the Siemens' furnace is the manufacture of manganese-steel for castings; as, if a manganese ore, containing, say, about 14 per cent. of manganese and 35 per cent. of iron, was used entirely as the oxidising agent, I should expect to get an alloy of steel rich in manganese, the degree of richness varying with the ore used. This is a matter I had hoped to prove experimentally before this, but have not had time to do so yet. With regard to the removal of phosphorus, there should be no difficulty even with a cinder pig containing 3·5 per cent.—provided it is low in silicon—sulphur could be worked without trouble, although of course it would take longer to work than a pig with 2 to 2·5 per cent. of phosphate. The question of the most economic relation of pig and scrap, I think, depends almost entirely on their relative values at the particular place. In districts where scrap can be had very cheap, even as much as 80 per cent. may be worked with advantage, especially in conjunction with a low phosphate pig, as the charges can then be worked very rapidly; on the other hand, when scrap is dear and pig cheap, the better plan may be to work entirely the latter. Generally speaking, the limits of scrap will vary from 20 to 40 per cent. of the charge, according to local conditions. There is another branch of basic working which I think may ultimately be of great importance, and that is the production of an exceptionally pure material by the use of hematite pig. I give the results of a chart worked-off at our works, with analysis of samples taken every half-hour after melting; and the final product is exceptionally free from phosphate, and is certainly the purest material that can be obtained by any steel process, and in fact, the product is equal to the best Swedish bars. The first sample taken after melting is a very interesting one, as it is practically a pure carbide of iron, which, in my opinion, ought to make an excellent material for steel castings especially. The carbon was not reduced below 1·000. The No. 1 sample worked well under the hammer, with the exception of a slight shortness; but as steel castings in ordinary practice are not forged, this, even if it could not be prevented, would be of no great consequence, and the homogeneity of this material would be likely to make it superior to the average steel castings in its resistance to sudden shocks, and I think it could be made equally cheap, if not cheaper. For a new process like the B.S. there are many little practical difficulties with which the steel-maker has to contend, and it must of necessity be so with every process in its early stages, but they are all matters of mechanical detail, which every day get less, and the success of the process is now an established fact. As it

is the only practical process which is especially adapted to meet the requirements of a district like this, I can only hope that as it develops it may be to Staffordshire in the future what puddling has been in the past, and enable our ironmasters to hold their own with mild steel, as they have with their finished iron, in every market in the world."—Messrs. Silvester, Turner, Edwards, Walker, Millward, Colley, Hudson, and other members took part in the discussion which followed.—In his reply, Mr. Harboard said the system would have to be worked some time before comparative results could be exactly given, but he had reason to believe that it would work quite as economically as the Basic Bessemer.

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We regret to have to announce the death of a distinguished townsman, Mr. John Benjamin Dancer, which took place at his residence, Greenhill-street, Greenheys, on Thursday evening, the 24th ult. For some time Mr. Dancer has been in very delicate health, and to this suffering was added the terrible affliction of total blindness. Mr. Dancer was born in London on October 8, 1812, and may be said to have been born an optician, his father and grandfather having been makers of optical and scientific instruments. In 1818 his father, Mr. Josiah Dancer, removed to Liverpool, where he carried on the business of optician and philosophical instrument maker; he was also a public lecturer on science, and was an active promoter of the Mechanics' Institute and Literary and Philosophical Institution of Liverpool. The foundation of Mr. Dancer's optical knowledge was laid in his father's workshop. He also assisted his father in his lectures, and very early in life evidenced a strong bias for mechanical and scientific pursuits. In 1835 the father died, and the business was afterwards carried on by the subject of this sketch.

After a few years Mr. Dancer removed to Manchester, where we find him in 1842 elected a member of the Literary and Philosophical Society, his diploma being signed by Dr. Dalton. In 1845 he became a Fellow of the Royal Astronomical Society. In the successful exhibitions which were held many years ago at the Mechanics' Institution, both in Cooper-street and, after its removal, in David-street, Mr. Dancer took a very important part. It was he who suggested the application of photography to the magic lantern, and who, by the use of lime light, or Drummond light as it used to be called, made such application possible. The exhibition of photography on so colossal a scale took the world by surprise, and this grand application of the marvellous art, which has now become so familiar to us, was received with the admiration it deserved. Mr. Dancer's services to the lantern did not end with the application of photography to it; he also improved the arrangement of the optical parts, producing a clearer image and a flatter field than had before been obtainable. At the Mechanics' Exhibitions Mr. Dancer, as was pointed out in these columns some months ago, was in no small measure responsible for the "fairy fountain," or, as it was at first called—and until Mr. E. Hutchings invented the name by which the fountain has since been known—the "optical chromatic fountain." The fairy fountain of the Jubilee Exhibition is an extension of the original idea, and though shown on a much grander scale and in the open air, it will probably be agreed by those old enough to remember the original that the beauty of the old Mechanics' fountain has never been excelled, even at Old Trafford.

A list of the instruments, apparatus, and processes in the invention or improvement of which Mr. Dancer has been concerned is too considerable to reproduce here, and would probably astonish even Mr. Dancer's oldest friends. In 1838 he suggested the introduction of earthenware porous jars to separate the two solutions in voltaic batteries, which before this time was done by means of bladder or other animal tissue. Porous jars have since been universally used, and it may safely be said will continue to be used so long as the voltaic battery endures. Dr. Golding Bird, in his "Elements of Natural Philosophy," published in 1839, gave Mr. Dancer credit for the invention, but that is the most conspicuous acknowledgment he received for an improvement of the very greatest importance to science. In the same year he invented a still more important instrument, namely, the automatic contact breaker, or the vibrating interrupter—an instrument which is absolutely indispensable at the present day wherever electricity is employed for telegraphy or signalling. The well known electric bell is one form of the interrupter, and probably not one in ten thousand of those who use an electric call know to whom they are indebted for it. Again, in 1838, and resulting from the same experiments, came the deposition of metallic copper by voltaic electricity. This was the very beginning of electro-plating, of which art Mr. Dancer was really the inventor, though others have run away with the credit of it. Among other improvements of batteries made by Mr. Dancer there was the introduction of crimped or corrugated plates, so as to give a larger acting service—a device which has been the subject of recent patents by some who know nothing of Mr. Dancer's having forestalled them by half a century. In 1839 he introduced photography to Liverpool, working Daguerre's process, and in 1841 he was the first to do the same for Manchester, which had not yet seen a photographic camera. In the same year he commenced microscope photography on Daguerreotype plates, and this wonderful art he perfected in 1852, when the introduction of the collodion process much simplified this and every other photographic process. These tiny examples of photography excited the warmest admiration and commendation from Sir David Brewster and other distinguished men. Mr. Dancer's diffidence prevented him from claiming for himself in this as in other discoveries the acknowledgment that was his due. The invention of microphotos was claimed elsewhere, but after a full inquiry by Mr. Joseph Sidebotham, Mr. Edward W. Binney, and the Manchester Photographic Society, Mr. Dancer's claim was allowed. In his record Mr. Sidebotham wrote in 1859: "Mr. Dancer's modesty will not allow him to speak of his own discoveries, but I am sure you all join in the annoyance I have felt in seeing persons coolly claim as their *own new discoveries* what our respected townsman has accomplished so many years ago." In 1853 Mr. Dancer invented the twin-lens stereoscopic camera; that is, a camera with two lenses placed side by side, at a short distance apart. Before Mr. Dancer took the matter in hand photographers had disagreed as to the distance the camera should be moved for the second picture. In order to give in the stereoscope the proper relief effect some advocated eight inches distance, and some so much as twenty-four. Mr. Dancer was convinced that the proper separation was the ordinary distance between the eyes of a human being, and made his camera under this idea; for the purpose no other camera is used now. Writing in April last to a friend, Mr. Dancer says on the subject of stereoscopic photography: "Whoever undertakes the photographing of the articles collected in the Jubilee Exhibition which may possibly not be excelled by any collection for many years to come, will, I sincerely hope, freely use the stereoscopic camera. In my humble opinion, based on thirty years' experience, stereoscopic photography is the only process suitable for photographing the solid objects contained in such exhibitions. There is one advantage connected with it which is very little known, or otherwise stereoscopic photography would never have fallen into such disuse as it has done of late years. The advantage is this, if the lenses used are of the same focus as those used in the stereoscope through which the pictures are viewed, the objects represented appear of the same size as the real objects did to the human eye when viewed from the place where the camera was situated." It is to be regretted that such a series of pictures as Mr. Dancer hoped would be made was not undertaken at the Exhibition.

Omitting several other instruments which Mr. Dancer improved, we must mention his connection with Dr. Joule in his renowned heat experiments and discoveries. Dr. Joule found the necessity for accurate thermometers, and with Mr. Dancer's assistance determined to make them for himself.

production of a new thermometer—"the land with any pretensions to accuracy" (we scale himself). Mr. Dancer arranged the aring the internal capacity of the bore of tubes, and constructed for Dr. Joule the he employed in his determination of the ent of heat, also a tangent galvanometer instruments.

connection with the microscope Professor thus wrote a few months ago: "When lished himself as an optician in Manchester made itself felt amongst the few micro- ing in the district. Good microscopes were worthless ones very common. Mr. Dancer ught out several forms of instruments, as r mechanical and optical arrangements as rate in price. Instruments fully equal to the original research were thus brought within y whose observing faculties were more con- their financial resources. It would be difficult the stimulus which Mr. Dancer thus gave to icroscopy; it cannot be doubted that the of our local microscopists is the direct out- impulse which their means of research then

unnecessary to continue the extraordinary list er's achievements. Suffice it to say that the ludes such appliances as surveyors' levels, air d counters, anemometers, and telescopes. Mr. also concerned with Dr. Angus Smith in his l examinations of the dust of the Manchester er such a catalogue as this one would in the rse of things suppose that we should have to Mr. Dancer had died one of the most wealthy me. Unhappily, he has died one of the poorest. for business push and flare, he has kept in the while others have gained by his labour; too look after paying business, he has "wasted," as ps be termed, time on the scientific interests of e and effort which might have been turned to his Any scientific man if finding himself confronted ty has gone, all through the last forty years, to Mr. o an encyclopædia. Days absorbed in this way ade up by nights spent over the microscope, and Mr. Dancer lost his most precious possession—his ot suddenly, but little by little. His knowledge state even enabled him to make diagrams of the of the retina, and to show the surgeon how it was ming unserviceable. Blindness to such a man le affliction indeed. With the failure of his sight began to fail, and a few years ago the old shop, ery Manchester man, had to be shut up. Then men came together, an appeal for subscriptions through the papers, and very quickly a few unds were raised. From that time the small has come from this fund has been Mr. Dancer's of living. The story is one of the saddest it has ur lot to chronicle.

e mind never lost its interest in the studies and of his earlier years. By his numerous friends his to the last highly appreciated, and his modest disposition greatly enhanced the pleasure and f his conversation. His single-minded devotion nch of physics was not less remarkable than his dustry and the inventive genius by which it was results of no ordinary importance to the mechani- lover of natural science.—*Manchester Guardian.*

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s.—French manufacturers are about to follow the their neighbours, and establish themselves abroad. s de France are preparing to transfer their works omprising Bessemer converters, Martin furnaces, mills, to Spain. Negotiations are now in pro- his view between the French Company and cer- ant Spanish firms, with whom the former will cert.—*Industries.*

SPECIAL NOTICE.

THE favour already accorded to **The Chemical Trade Journal** is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, **the Organ** of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

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[illegible] in the [illegible] have been [illegible] grains, without [illegible] purifying

[illegible] the electric light [illegible] we shall soon [illegible] experiment at [illegible] back granted [illegible] Light and [illegible] was started. [illegible] the Parade, [illegible] and [illegible] the Theatre [illegible] Warwickshire

[illegible] —We cannot [illegible] can allow [illegible] been the case [illegible] conceive [illegible] to treat [illegible] head Gas [illegible] their district. [illegible] Oil-gas, [illegible] places, has [illegible] says:—"The [illegible] the remain- [illegible] a full supply [illegible] was felt by [illegible] seven o'clock, [illegible] three weeks."

[illegible] management of the [illegible] y acero de [illegible] works in the [illegible] dividend on [illegible] rate of 7½

[illegible] a rural dis- [illegible] that some [illegible] placed six of [illegible] result was [illegible] the premises

[illegible] that a large [illegible] works and [illegible] imposed [illegible] customers being

[illegible] new industry will [illegible] that an [illegible] carry on [illegible] known as [illegible] works [illegible] can be [illegible] Birmingham, [illegible] then pro- [illegible] scientists. [illegible] between the [illegible] alkali works, [illegible] commenced. [illegible] works will

[illegible] LITERARY [illegible] a lecture [illegible] in the [illegible] subject was [illegible] subject was [illegible] illustrations in [illegible] of the Niagara [illegible] springs, hail- [illegible] sheets of water, [illegible] the English Lakes, the [illegible] peculiarities of each [illegible] The action of acids

DARLASTON COAL AND IRON COMPANY LIMITED.—The annual meeting of this Staffordshire Company was held on Wednesday, the 23rd ult. The report showed £600 loss, making a total loss since the company's formation of £1,200, all of which had been incurred on the collieries.—The chairman said the company had spent £38,000 purely for the benefit of the colliery ground landlord, who refused to grant any remission of royalties.—Another speaker said Staffordshire would cease to be an industrial centre unless provided with better water communication.

BREACH OF THE EXPLOSIVES ACT.—At the Hanley Borough Police Court, on the 23rd ult., John Bradbury, brickmaker, Lady's Well, Hanley, was charged with having committed an offence under the Explosives Act.—Inspector Vickers stated that the defendant was entitled to keep 30lb. of gunpowder on his premises for blasting purposes, but on the previous day he visited the defendant's brickworks, and discovered 75lb. of gunpowder locked up in a building adjoining Brook-street.—There was no defence, and the magistrates imposed a fine of 20s. and 9s. 6d. costs.

THE WEARDALE IRONSTONE INDUSTRY: RE-OPENING OF WORKS.—After being closed for nearly two years, the Weardale Ironstone Works have been re-opened. The lessees of the Weardale iron mines are the Weardale Iron and Coal Company, whose royalty extends over the parish of Stanhope, their principal works being at Red Vein, Stanhope, Rookhope, and Upper Weardale. The works opened are the inside mines at Middlehope and at Rowantree Syke and the open ironstone mine at Wearhead, and the ironstone produced at these mines is for the furnace at Tudhoe.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, TUESDAY MORNING.

PARAFFIN chemicals have all hardened a further degree, with the exception of oil for burning purposes, which is stationary at the late rise, being held in check by American and Russian importations. Scale and wax are scarce, and uncovered consumers, so far as they can guess at it, take in the prospect ahead with some anxiety; while on the other hand the financial prospects of the Scotch mineral oil companies are all signally improved, with quite a revival on the Stock Exchanges. Sulphate of ammonia is barely so promising as it was a week ago, and although £11. 10s. to £11. 12s. 6d. has been nominally the price, and is so to-day, it is very doubtful whether any business at all has been done even at the lower figure. The market leans certainly in buyers' favour, but as yet not markedly so. Scotch dealers anticipate some drop in the article. The Glasgow and west coast bichromate works have come upon an improved demand during the past few days, but there is still much slackness to make up. In the general market caustic soda, saltcake, and soda crystals are weaker; bleach about holds the mark of last week, and sulphate of copper is another pound or thirty shillings to the good. General prices current are:—Soda crystals, 44s. net Tyne; alum, £5. less 2½ % Glasgow; borax, English refined, £31, and boracic acid, £46 net Glasgow; soda-ash, 48/50°, 1d., less 5 % Tyne; caustic soda, white, 76°, £9. 5s., 70/72°, £7. 5s., and cream, 60/62°, £6. 2s. 6d., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52°, 1⅛d., less 2½ % Tyne; saltcake, 20s. to 20s. 6d. f.o.r. Glasgow; bleaching powder, £8, f.o.r. Glasgow; bichromate of potash, 4½d., and of soda, 3½d., less 5 and 6 % to Scotch and English respectively; nitrate of soda, 8s. 9d. to 9s., chlorate of potash 6d. less 5 %; sulphate of ammonia, £11. 10s. to £11. 12. 6, f.o.b. Leith; paraffin scale, hard 2½d., soft, 2d.; paraffin wax, 120° semi-refined, 3d., and remelted, 2¼d.; naphtha, 7½d.; burning oil (mineral), 5d. to 6d.; lubricating oil (mineral), 865°, £5. 10s., and 885°, £6. 10s. to £7; sulphate of copper, £17 to £17. 10s., less 5 % Liverpool. Last week's Clyde harbour imports included 105 tons sulphur ore, 987 tons pyrites of copper, 1,000 barrels American oil, and 137 packages of American wax.

THE ALKALI TRADE.

is nothing new to report in the Alkali trade, e the fact that the Hermite process for bleaching y is assuming a more practical shape and is being orked out, the outlook for it is very hopeful. rted that the Seaham works, at or near New- me, after having been closed for some years, are estarted; this is another weak link in the Bleach as it cannot be doubted that the manufacture of is contemplated. Muriatic acid has been raised r, by the Widnes and Runcorn makers, to 7d. –not a dangerous rise for the consumer, and one nd to think he will pay. Had the rise been more e "salts" would have been ousted in several nts.

MINERAL AND METAL MARKETS.

at advance in copper and tin has been the all opic of the past few weeks. Most copper pro- ght that the prices were as near the bottom as they at very few imagined that a rise of nearly 40 per take place within the short space of four weeks. ered very doubtful whether the advance will be as large stocks will be let loose; in the mean- er, copper, tin, and spelter firmly maintain their Brimstone is but in poor request, and prices show d tendency. Manganese is plentiful, and low practicably unsaleable. Ironmasters are looking a reduction in the price of ore, as on present ould pay better to blow out their furnaces.

ISCELLANEOUS CHEMICAL MARKET.

n the metal market still continue to advance. considerable rise in copper, and quotations for copper now stand £18. 10s. to £19., makers well sold for some months ahead. Pig lead, litharge are dearer; good brands of the latter now . 10s. nett. Acetates and nitrate of lead are firm at in our list of current quotations. Brown sugar scarce. Acetates of lime are in fair demand. £9. 15s., and grey dearer, at £14 per ton. hates of lime are in good request, and makers are d with orders as usual at this period of the year. soda is unchanged at 8s. 9d. to 9s. per cwt. f ammonia is quiet. Muriate of ammonia keeps . There is a brisk demand for bleaching powder, ss is being done both for prompt and future £7. 12s. 6d. and £7. 10s. respectively at works. a shade firmer for spot delivery. Prussiates and of potash and soda are quiet, but prices are firm. id 85 %, 4½d. per lb. Sulphocyanides rather

THE TAR PRODUCTS MARKET.

aptha sellers are in a dilemma, hardly knowing for next year; anyhow, a few are taking the bull s by selling forward for all next year. The price rd mentioned for large transactions has been 13d. less the usual discounts. 90's and 50/90's benzol at the same figure as in our last report, the ng to find ultimate buyers. Creosote is in much id, and large sales have been made at 1¼d. for ery, and we have heard of 1½d. for forward. nd carbolic acid still keep firm, while pitch is s can be, nevertheless stocks are in excess, and simply for the reason that manufacturers continue storage room, left at home. Oil millers sending

THE SULPHATE OF AMMONIA MARKET.

THE wants of speculators for November having been in a great measure filled, the "Bear" movement has commenced in earnest with the intention of forcing back prices to enable purchases to be made for December. Manchester holds, however, a large stock, and what is done with it during the next few weeks will determine, to a great measure, the December values. £11 10s. to £11 11s. 3d. f.o.b. Hull, may be said to be the speculators' price, but there is no doubt many makers will hold rather than sell, as the Spring demand will soon be upon us. All the markets are similarly affected, but there is no fear of prices falling to any very low level, unless the makers themselves conduce towards it.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

16084. F. FOSTER. For generating carbonic acid gas. Nov. 23.

16116. E. GRÜNE. For improvements in the manufacture of Kieselguhr-dynamite. Nov. 23.

COMPLETE SPECIFICATIONS ACCEPTED.

12259. R. DE SOLDENHOFF. For improvements in the desiccation, incineration, and carbonisation of precipitants or solids, resulting from sludge or other substances liable to putrify, and in means or apparatus employed therein. September 27, 1886.

17059. W. GERDES. For improvements relating to the treatment of the waste products of breweries, for the production of alcoholic liquor. Dec. 29. 1886.

986. V. C. A. M. BONDONNEAU and A. J. M. G. FORET. For process and apparatus for acid saccharification of starchy materials. January 21, 1887.

4492. H. H. LAKE. A communication from K. Oehler, of Germany. For improvements in the manufacture of colouring matters. March 25, 1887.

4583. R. H. W. BIGGS. For improvements in the manufacture of dyes, disinfectants, artificial stone, artificial ivory, artificial manure, sodium chloride, zinc sulphate, and zinc carbonate. March 28, 1887.

Letters Patent have been issued for the following:—

11889. F. M. LYTE. For improvements in the manufacture of pigments. September 18, 1886.

13286. A. FRANK. For improvements relating to the treatment of spent lyes used in the manufacture of cellulose by means of sulphites, for the recovery of sulphurous acid therefrom, and to the utilisation of the said lyes after such treatment. Oct. 18, 1886.

13929. H. ELLISON and G. E. DAVIS. For a new or improved method for the distillation of coal-tar, the oils from coke-ovens, and other similar fluids. October 30, 1886.

14625. J. H. JOHNSON. A communication from The Badische Anilin and Soda Fabrik of Germany. Improvements in the preparation of red colouring matters. November 11, 1886.

14673. E. HERMITE and E. J. PATERSON, and C. F. COOPER. For improvements in apparatus for the preparation of bleaching solutions by electrolysis. November 12, 1886.

14803. F. A. ABEL. For a manufacture of smokeless explosive. November 15, 1886.

15352. W. BURNS. For improvements in the manufacture of bicarbonate and carbonate of soda, by the ammonia process, and in the construction and use of apparatus for that purpose. Nov. 25, 1886.

10815. W. P. THOMPSON. A communication from M. Gerrish, of United States. For new and improved process and apparatus for procuring aluminium. August 6, 1887.

OUR PRICE CURRENT.

PREPARED BY HIGGINBOTTOM AND CO., 116, PORTLAND STREET, MANCHESTER.

The values stated are F.O.R. *at maker's works, or at usual ports of shipment in U.K. The prices in di localities may vary.*

		£	s.	d.
ACIDS:—				
,, Acetic, 25 °/.	per cwt.	0	10	3
,, ,, Glacial	per lb.	0	0	6⅞
,, Arsenic, S.G. 200°	per cwt.	0	11	6
,, Chromic 85 °/.	per lb.	0	0	4½
,, Fluoric	,,	0	0	4½
,, Muriatic (Tower salts) 30° Tw.,	per bottle	0	0	7
,, ,, (cylinder) 30° Tw.	,,	0	3	0
,, Nitric, 80° Tw.	per lb.	0	0	2¾
,, Nitrous	,,	0	0	2¼
,, Oxalic	,,	0	0	4½
,, Sulphuric (fuming 40 °/.)	per ton	12	0	0
,, ,, (Brimstone 168°)	,,	3	17	6
,, ,, (Pyrites 168°)	,,	3	5	0
,, ,, (spent oxide 168°)	,,	3	17	6
,, ,, (,, 150°)	,,	2	2	6
,, ,, (Pyrites 150°)	,,	1	15	0
,, Tartaric	per lb.	0	1	6½
Arsenic, white powdered	per ton	10	12	6
Alum (loose lump)	,,	4	13	9
Ammonia, ·880 – 28°	per lb.	0	0	3¼
,, = 24°	,,	0	0	1¾
,, Carbonate	,,	0	0	3½
,, Muriate	per ton	22	0	0
,, ,, (sal-ammoniac)	per cwt.	34/- & 32/-		
,, Sulphate (grey), London	per ton	11	11	3
,, ,, (grey), Hull	,,	11	12	6
Aniline Oil	per lb.	0	0	9½
,, Salt	,,	0	0	8¼
Antimony	per ton	39	0	0
,, (tartar emetic)	per lb.	0	1	1½
Barium Chloride	per ton	7	10	0
,, Carbonate (native)	,,	4	10	0
,, Sulphate (native levigated)	,,	3	5	0
Bleaching Powder, 35 °/.	,,	7	12	6
,, Liquor, 7 °/.	,,	2	12	6
Bisulphide of Carbon	,,	12	5	0
COAL-TAR DYES:—				
Alizarine (artificial) 20%	per lb.	0	0	9
Magenta	,,	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 °/. f.o.b. London,	per unit per cwt	0	1	3
Benzol, 90 °/. ,,	per gallon	0	3	0
,, 50/90 ,,	,,	0	2	5
Carbolic Acid (crystallised 35°)	per lb.	0	1	1½
,, (crude 60°)	per gallon	0	3	10½
Creosote (ordinary)	,,	0	0	1½
,, (filtered for Lucigen light)	,,	0	0	2½
Crude Naphtha, 30 °/. @ 120° C.	,,	0	1	3
Grease Oils, 22° Tw.	per ton	1	17	6
Pitch, f.o.b. Liverpool or Garston	,,	0	11	0
Coke-oven Oils (crude)	per gallon	0	0	1½
,, (distilled)	,,	0	0	2½
Copper (Chili bars)	per ton	65	15	0
,, Sulphate	,,	18	10	0
,, Oxide (copper scales)	,,	52	10	0
Glue	per cwt.	1	15	0
Glycerine (crude)	per ton	33	0	0
,, (refined)	,,	55	0	0
Iron (turnings)	,,	1	13	0
,, Peroxide (blue billy)	,,	0	7	0
,, ,, (bog ochre)	,,	1	13	0
,, ,, (precipitated	,,	3	0	0
,, Sulphate (copperas)	,,	1	2	6
,, Sulphide (antimony slag)	,,	1	0	0
Lead (sheet) for cash	,,	14	17	6
,, Acetate (white)	,,	26	10	0
,, ,, (brown	,,	19	10	0
,, Nitrate	,,	22	5	0

		£
Lime, Acetate (brown)	per ton	9
,, ,, (grey)	,,	14
Magnesium (ribbon and wire)	per oz.	0
,, Chloride	per ton	2
,, Carbonate	per cwt.	1
,, Hydrate	,,	0
,, Sulphate (Epsom Salts)	per ton	2
Manganese Sulphate	,,	19
,, Borate	per cwt.	2
,, Ore, 70 °/.	per ton	2
Methylated Spirit, 60° O.P.	per gallon	0
Naphtha (Wood), Solvent	,,	0
,, ,, Miscible, 60° O.P.	,,	0
OILS:—Castor	per cwt.	1
Cotton-seed	per ton	20
Linseed	,,	20
Lubricating, Scotch, 885°—890°	,,	6
Petroleum, Russian	per gallon	0
,, American	,,	0
Silver (metal)	per oz.	0
,, Nitrate	,,	0
STARCHES:—		
Sago	per cwt.	0
Potato (farina)	,,	0
Sodium (metal)	per lb.	0
,, Carb. (refined Soda-ash) 48 °/.	per ton	4
,, ,, (Caustic Soda-ash) 48 °/.	,,	3
,, ,, (Carb. Soda-ash) 48 °/.	,,	4
,, ,, (Soda Crystals)	,,	2
,, ,, (Crystal Carbonate)	,,	5
,, Chlorate	per lb.	0
,, Borate (Borax)	per cwt.	1
,, Bichromate	per lb.	0
,, Hydrate (74 °/. Caustic Soda)	per ton	8
,, ,, (70 °/. Caustic Soda)	,,	7
,, ,, (60 °/. Caustic Soda, white)	,,	6
,, ,, (60 °/. Caustic Soda, cream)	,,	6
,, Bicarbonate	,,	5
,, Hyposulphite	,,	5
,, Nitrate (95 °/.) ex ship Liverpool	per cwt.	0
,, Silicate (glass)	per ton	5
,, ,, (liquid, 100° Tw.)	,,	4
,, Sulphate (Salt-cake)	,,	1
,, ,, (Glauber's Salts)	,,	1
,, Sulphite	,,	5
Potassium (metal)	per oz.	0
,, Bichromate	per lb.	0
,, Carbonate, 90%	per cwt.	0
,, Chlorate	per lb.	0
,, Hydrate (Caustic Potash)	per ton	22
,, Nitrate (refined)	per cwt.	1
,, Prussiate Yellow	per lb.	0
,, Sulphate, 90 °/.	per ton	9 1
,, Muriate, 80 °/.	,,	8 1
Strontium Hydrate, 98 °/.	,,	7
Sugar, Beet	per cwt.	0 1
,, Cane	,,	0
Sulphocyanide of Barium	per lb.	0
,, Ammonium		0
Sulphur (Flowers)		1
,, (Roll Brimstone)		
Superphosphate of Lime (28 °/.)		
Tallow		
Tin (metal)	,,	
,, Crystals	per ll	
Zinc (Spelter)	per to	
,, Chloride (solution 96° Tw.)	,,	

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RTISERS.

EAR'S NUMBER OF THE TRADE JOURNAL.

the approaching New Year we shall NUMBER of the Journal. We our first volume to a close with the last ecember, 1887. The issue of January 7th, will commence Volume II. It will be an ial number of very general interest. We shall with it a Title-page and Index for the first ther with a neat and useful Office Almanac, our subscribers, which is now in course of

our regular subscribers, our New Year's ll be issued to NOT LESS THAN 10,000 AND INDIVIDUALS, so that intending will see at once that this issue is worthy of attention.

explain that, in our Publishing Department, we y carefully-compiled lists—in most cases the cial knowledge and information at our com- very firm of repute, both at home and in the g centres abroad, connected with the various hose interests it is our province to serve. We utilise these lists week by week, by selecting a number of them in turn, and sending out free copies of the Journal to those firms who have not yet become annual subscribers. The result is that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of New Year's Special Number we shall MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO, numbering altogether, as we have stated, not less than 10,000 names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

TECHNICAL EDUCATION.

FORTUNATELY epidemics are not very frequent in England, but at the present time there is rife amongst us a very serious disease, which takes the form of a cry for technical education. It is this disease which demands a cure. We do not wish to infer by this, that education fitted to supply the rising generation with a sound commercial knowledge so as to enable them to excel in the various branches of commercial enterprise is not required, but we do say that simply to parade the country with a cry for technical education without precisely defining what is meant by it, is a serious source of danger to the community, and a danger which may result in the spending of large sums of money without those requiring it getting the *quid pro quo*.

When we come to look below the surface we shall find that this cry for technical education has mainly sprung from one source, the professional element in this country, and that it has been forced upon them by reason of the severe cry of foreign competition. Technical education is to be the remedy, but not one of those who have paraded public platforms has given us the faintest clue as to what they are aiming at or what they actually require the Government to do.

Now, it is quite certain that if technical education means the application of science to practice, the teaching of those applications must be entrusted to teaching bodies, and it is also certain that the teachers, or professors, or lecturers, or by whatever names they may be hereafter called, must be men who have had some experience in the various handicrafts which are supposed to be lacking in experience and in science. If scientific truths are to be driven into the hard-headed Englishman, the teacher or lecturer must know the exact vulnerable point, otherwise his attempts will be of very little use. In our methods of dealing with public subjects in England, we have gained the unenviable notoriety of accomplishing the least possible result with the greatest possible expenditure, and we are very much afraid that without the subject is discussed from a very different standpoint to that now adopted, the subject of technical education will prove no exception to the rule.

We take it for granted that those professors of chemistry and those members of Parliament who have inaugurated the technical education campaign know perfectly well what the manufacturing community requires. It is not quite clear whether this is so, as if it were why have not those professors, when they have been part of the governing body of teaching colleges, done their best to ensure that efficient teaching of the scientific side of commercial subjects which they now believe to be necessary? How is

s was worked out under the technical skill of Dr. Hurter, wherein a mixture of hydrochloric acid gas mospheric air was made to yield chlorine and water. rocess, which at the time promised so much, has not th extensive adoption; still, we feel bound to say, ur own personal knowledge of the manufacture by thod, that the fault does not lie with the process.

other process peculiar to the works of Messrs. l Deacon and Co. is the manufacture of crystal ate, a monohydrated carbonate of soda, a compound in every respect equal to soda crystals, but containing uch more alkali. We have always been at a loss to tand why soda crystals are used for manufacturing es, except to ensure freedom from causticity and olution. If these be the only reasons, it is clear that owing to its superior strength and olubility, "crystal soda" ought to be universally l.

tal soda has also enabled Messrs. Gaskell Deacon to prepare several other salts of soda much more ically than by the older methods; bicarbonate of d the sulphites of soda may be prepared from it more economically than from the soda crystals y used. It is stated, though we do not know on authority, that this firm now commands one-third ntire trade of the world in bicarbonate of soda.

ing on one side the exhibits relating to the salt at Middlesbrough, the most important innovation alkali trade was shown by the cases of Messrs. r Mond and Co., at Northwich, and Messrs. Bell rs, at Middlesbrough, wherein the results of two ways of working the ammonia-soda process were Messrs. Brunner Mond and Co. showed ammonia-ade by Solvay's process, and Messrs. Bell Brothers oduced by Schlösing's method; the former was the omplete exhibit, and the bleaching powder made by nickel process, as well as the caustic soda by s method, were very interesting from a technical f view. From an historical standpoint the exhibit d 821, showing the apparatus as used by Mr. John of Chorley, in his experiments upon the ammonia , was interesting, but it seems a step from the us to the sublime, when we look upon the few tubs and strainers, and follow in our mind's eye tly, immense, and extremely scientific plant now g at Messrs. Brunner Mond and Co.'s works at igton. Messrs. Bell Brothers' exhibit was not set l enough to attract attention, still there was plenty esting matter for the technical student who under-he bearing of all the various articles exhibited.

n we may say, it strikes us very forcibly that if nakers wish to make their cases interesting they set out their articles on different lines, and show eral public—aye, and buyers as well, the results of the processes into which their products enter, with ions and new ideas of further extension.

GAS-TAR AND ITS USES.

XI.

ating furnaces and steam boilers by means of the illustrated on page 244, when compressed air is ed, we are able to calculate with extreme accuracy tive value of gas-tar and coke, as in the communi-of M. Zubr to the *Journal de l'eclairage au gaz* the has been treated in a very complete manner, quite t to many of the abortive experiments attempted at M. Zubr tells us that the boiler to which the tar was attached was about four feet in diameter teen feet in length, and built up of quarter-inch To protect the plates of this boiler and the rivet rom the cutting action of the tar flame, there were d under the boiler a range of fire-clay blocks, with openings leading into the combustion chamber into which the tar was injected. These fire-clay blocks are heated very rapidly, and soon acquire a white heat on that side towards the fire, while the surface next the boiler is only red. This is sufficient to protect the plates of the boiler from the action of the intense flame, and it follows that the combustion of the tar is more perfect when there is the opportunity of contact with highly-heated surfaces. At a distance of about two feet inwards from the front of the furnace there is placed a pillar, to subdivide the tar flame escaping from the burner, so as to spread it equally throughout the combustion chamber. The air necessary for the combustion of the tar enters between the tiles forming the bed of the fireplace; it is divided into two thin sheets on the right and the left of the pulveriser, and in its passage between these flues it gets heated to all temperatures, from 500° C. to 1,000° C. When the air is heated, the finely divided tar burns instantly, and it is necessary in order to obtain a good combustion that the air should enter underneath the tar flame and not above it. The volume of air admitted to the furnace depends of course upon the tar supply and the temperature required, but anyhow the air apertures should be furnished with a slide, so as to be able to control the quantity.

An inspector of the "Association des Propriétaires de Chaudières à Vapeur Contre les Accidents," M. Zwiauer, has stated the following results from the trial boiler at the Belvédère Works:—

Duration of experiment	10 hours.
Heating surface of the boiler	137 sq. ft.
Total consumption of tar	320 lbs.
Consumption of tar per hour	32 lbs.
Total feed water	3,046 lbs.
Water evaporated per hour	304 lbs.
Temperature of feed water	22°·5 C.
Mean temperature of steam	139° C.

An elementary analysis of the tar yielded the following results:—

Carbon	85·06
Hydrogen	4·55
Nitrogen	0·23
Sulphur	0·31
Water in combination	7·39
Hygrometric water	2·01
Ashes	0·45
	100·00

The calorific power of the tar after Dulong's formula would be 8,838 calories, showing the evaporative power of such a fuel to be 13·17 pounds of water for each pound of fuel consumed, and it is further indicated that a pound of tar would require theoretically 11·456 pounds of air for complete combustion, or 144 cubic feet.

The mean composition of the products of combustion were as follows:—

	Parts by Weight.
Carbonic acid	12·732
Carbonic oxide	0·000
Nitrogen	56·833
Atmospheric air	30·435
	100·000

Mean temperature of the escaping gases 226° C.

Temperature of the air supply 26° C.

The products of combustion from one pound of gas-tar were therefore of the following composition:—

Carbonic acid	3·119
Atmospheric air	4·876
Nitrogen	8·844
Water vapour	0·668
" " condensed	0·549
	18·056

Legal.

A REFRIGERATING PATENT CASE.

Chancery Division, on Friday the 2nd inst., the *The Haslam Foundry and Engineering Company ellow* was heard before Mr. Justice Kay. The General moved for leave to make application to under section 19 of the Patent Act. He stated action was brought by the plaintiffs, of Derby, the defendant, carrying on business at Hyde, nchester, for the infringement of a patent for ing machinery, &c., on board ship, which had means of establishing the dead meat trade colonies to England. There were three claims atent, one being with reference to the construc- he refrigerating chamber and machinery, and as to the way in which it was worked. An ainst another infringer was tried before Mr. Stephen before the long vacation, and that vas strenuously fought. In that action the s alleged non-infringement on the ground that claim with regard to the mode of construction and also on the ground that the second claim rd to the way in which the engine for exhausting the air was bad. On the 12th November last, long vacation, Mr. Justice Stephen delivered an judgment, finding in favour of the plaintiffs on nt except the second claim, which had reference de of construction of the machinery for exhausting the air. At this time the present action was n his Lordship's Court, and he now had to ask to apply to disclaim in respect of the second d for stay of proceedings.

stice Kay, in delivering judgment, said what he to do was to give plaintiffs leave to amend the statement of claim, and, if necessary, reply after n the disclaimer, and also to give leave to the t to amend his defence if necessary. That being plaintiffs must undertake forthwith, if they meant with the action, to amend by disclaimer, and if not done to consent to the action being dismissed ay the costs, subject to this—that the costs be to be dealt with according to the results of the is judgment would not prejudice any point that raised under any section of the Patent Act.

OBURITE FACTORY IN LANCASHIRE.

igan, on Friday the 2nd inst., before Mr. W. nd a full bench of magistrates, Mr. Richard structed by Mr. W. H. Vaudrey, of Manchester) or a license to manufacture and store a new , "roburite," at Gathurst, near Wigan. The ounsel stated that the Home Office, after full ion of the substance, had sanctioned its manufac- England, and subject to the assent of the local at the locality for which the license was asked. posed of two substances, both of which in their state are non-explosive, one of them being m nitrate and the other a highly complex organic of coal tar. Roburite, which is formed by their ion, is an explosive 25 per cent stronger than , but very much safer to handle and use, because y be exploded by means of a strong detonator, fulminate of mercury, and not by the simple n of heat and percussion. It has also the pecu- exploding without flame, so as to make its use ry mines. It has been in use for more than a year ny, and is recommended by the German Govern- ile the use of gunpowder in mines is forbidden. ian Government also recommend and use roburite. The works, which occupy land about 1,300 feet square, will be carried on under the supervision of the Home Office, and will employ 200 or 300 people. They will be so arranged that in the event of any accident occurring the damage will be localised, and will not extend beyond the one building in which it arises. The Lancashire and Yorkshire Railway Company and others had withdrawn their opposition, and there could be no doubt that the new manufacture would benefit the district and be a great boon to the mining industry.—After proving the service of the notices required under the Explosives Act, 1875, counsel called Mr. Cecil N. Hake, for some years with Dr. Dupré at the Home Office. Mr. Hake confirmed the statements of counsel as to the nature and properties of roburite, and the suitability of the works at Gathurst for its manufacture.—The bench granted the application.

THE BROXBURN SHALE MINERS' STRUGGLE.

THIS strike has now lasted twenty weeks, and it is evident that there is no immediate prospect of a settlement, the relations between the employers and the strikers being more embittered than ever. It will be remembered that the dispute arose through the employers reducing the men's wages by 4d. per ton. The men offered to half the difference, as had been done at Pumpherston and Holmes, but to this the employers would not agree. The men, however, remained firm, and were encouraged in their attitude by numerous subscriptions which began to come in to their support. This led to the eviction of a number who occupied the company's houses; and while some dozen families have been accommodated in wooden sheds erected for the purpose, and numbers in other quarters, not a few of the miners meanwhile took their departure for other mining centres, many of whom, it is said, are willing to return when a settlement is come to. In view of the fact that other twenty-nine persons—chiefly oncost men—have been warned to remove from their houses on or before the 26th ult., the officials of the Miners' Union have made a contract with a local joiner to erect another shed to accommodate thirteen families.

Regarding the present position of affairs, it has resolved itself into a question of who are to be the victors in the present dispute, and not a question of money. The employers are anxious to be freed from the strictures of the present Union. They have refused to give the strikers as a whole 4s. a shift, but are offering 4s. 6d. and upwards to strangers. The employers state that their works are in full swing, and that they have sufficient available material to keep them going till the month of March. They propose, however, to put out bills through the various mining centres stating that the company having some time ago opened their mines and offered employment to their miners at the rate of wages paid by other oil companies, which offer was rejected by a portion of the miners still in Broxburn, in addition to the men already working, require a number of good, steady miners, who can easily earn from 4s. 6d. to 5s. 6d. a day. The men, on the other hand, ridicule this statement, and say they are prepared to show from the check-weighmen's books that on the reduction the men could only make on an average 3s. 6d. to 4s. a day on a 2½-ton darg, which is 10 cwt. more than they could produce prior to the dispute. The miners at the new mines at Curldubs, who struck work recently, were being paid by the contractors 5s. and 5s. 6d. a shift, but these miners, being for the most part members of the Union, there was no alternative but that they should cease work when they came to the shale until a general settlement was come to. Last week six miners called at the Miners' Union office stating that they had come from Auchinleck, Ayrshire, intending to begin work, being informed that the strike was practically over. They declared that they had been misled, and were going to

[illegible] Queen's Bench, last we[illegible] an action [illegible] surveyor of Rar[illegible] taking out quantities [illegible] in addition to his salary [illegible] considered four breaches of the Pub[illegible] and gave judgment for the plaintiff [illegible] penalties and costs. By this judgment defenda[illegible] prevented ever holding office under a local author[illegible]

FERENCE OF TOBACCO GROWERS.

:RENCE of tobacco growers was held on Thursday, ıtant, at the Salisbury Hotel, London, under the ' of Sir E. Birkbeck. The chairman, in opening :dings, said that about a month ago, after a short upon the question of tobacco culture in England, ought very desirable that they should have a : in London in order to discuss the results of the 'ears' growth of tobacco in England, and to see .ny steps should be taken in the future to bring more successful issue to the very important They had thought it very desirable to call the t the present time, because all the growers had 'ed their tobacco to a very important stage. had many difficulties and obstacles to contend ng the past year; they had had a very dry which had been followed by a cold and damp r; and they had also had certain difficulties with l Revenue authorities. As regarded the people in his district, he was bound to say that they red him every possible assistance. He felt that ent would agree with him that there was among owers the greatest determination to persevere culture of tobacco in England. He had grown of tobacco during the past year—namely, the rick, the Yellow Prior, the Kentucky, and the He thought that they ought to take into con- the question of having a central warehouse n, where they might all send their growths as ey were dried, which would be a great help to the venue, inasmuch as they would only have one go to instead of numerous premises throughout s counties in England. He thought it would be ous to employ the best men that could be found em advice, and also to superintend the further their tobacco.—Mr. Faunce de Laune thought st difficulty which they had to contend with was o the Revenue Office. He contended that they ay so much an acre for their land for a certain years for the growing of tobacco. He thought were more likely to grow yellow tobacco in han dark, and it was to that tobacco that they direct their attention.—Mr. Wigram thought co ought to be grown on a much larger scale, ıtended that the duty ought to be taken off.—Mr. that during the past season he had had great growing, and his only difficulty was in curing.— nan said that in the cultivation they had had like 64 varieties. They had not expected to ıny great improvements, but had thought it in view of the indecision evinced, to obtain as ossible. They had been to every quarter of the re tobacco was grown to obtain all the varieties, as they had seen, they had not made a mistake cultivation of tobacco in this country. He ıat the yellow tobacco would pay much better arker-leaved sort.—The Rev. Wyndham Madden ıat if they could grow a fair cigar tobacco, steps taken to start a company. He contended that ofit would accrue from cigar making.—After her discussion, it was resolved that a com- uld be formed for the purpose of arranging a authorise the printing of such information as considered useful to lay before the growers of y; to consider the question of a central bonded ; and also to draft a Bill to lay before Parlia- the condition under which tobacco land in the ngdom might be cultivated. A committee was formed, and the proceedings terminated with a nks to the chairman.

SPECIAL NOTICE.

THE favour already accorded to The Chemical Trade Journal is of a very encouraging character, and proves beyond doubt that the Journal supplies a distinct want in the chemical and allied trades.

It will be the constant aim of the proprietors so to increase the usefulness of the Journal, as to make it *par excellence*, the Organ of the numerous and important industries in whose behalf it was established, and they will at all times be glad to receive from subscribers information and suggestions with a view to its improvement.

The proprietors beg to intimate that the Publishing Office has been removed to more central and convenient premises, and they have to request that all communications in future be addressed to

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It will thus be seen that *The Chemical Trade Journal* offers unusual facilities for bringing trade announcements under the notice of a large and important class of buyers; and when it is added that the tariff for advertisements is not an expensive one, the advantages of this department of the Journal will be apparent to all those who seek to extend their business by that indispensable aid to nineteenth century enterprise and success, viz., judicious advertising.

The English Crown Spelter Company. — The directors of the English Crown Spelter Company have resolved to declare an interim dividend for the year 1887 of 2½ per cent on the capital of the company.

Water Pumping.—A work of extreme difficulty—namely, the lifting of 1,000,000 gallons of water from the shaft of the Exhall Colliery, Warwickshire, and preventing by means of huge iron castings its further inflow—has just been crowned with success, after an outlay of many thousands of pounds and efforts extending over several months. The mine contains large beds of the finest Warwickshire coal.

Prospects of the Jute Crop in Bengal.—The final report for the year 1887 is as follows:—A preliminary forecast of the out-turn of the jute crop was issued on the 7th July last. In that forecast it was stated that the area sown this year is about 10 per cent above the normal, and that it may be expected that the total out-turn will be a full average. Further reports on the condition and prospects of the crop have now been received.

Action against the Cleckheaton Local Board.—An action has been heard at the Bradford County Court, in which Mrs. Holliday, a widow, residing at Marsh, Liversedge, claimed the sum of £50 as compensation for injury done to her health and business by nauseous gases arising from a sewer connected with the gasworks belonging to the Cleckheaton Local Board. Mr. Macmaster appeared in support of the action, and Mr. Clough represented the Local Board. For the defence several legal points were raised, the main one being that as the works which were alleged to be the cause of the nuisance were works carried out under the provisions of the Act of Parliament, the defendants were entitled to notice of action.—His Honour upheld this view, and accordingly nonsuited the plaintiff.

Prevention of Explosions in Collieries.—Mr. J. I. Mekerlé directs attention to the measures adopted in some of the Continental collieries to accomplish this object. It has been observed, he writes, that fire-damp gathers by preference in the highest part of the upper regions of the pit, near to the workings, and that it only escapes from coals newly cut or from newly-discovered veins. In the mines of Würm, near Aix-la-Chapelle, the proprietors had constructed a "canalisation" or channel leading to the front of all the workings, and conducting to a main pipe, which is joined on the surface to a colossal suction machine. By this system the worst class of pits can be worked without danger. The owners have gone further, and have succeeded, by uniting the main pipe to a gasometer, in discovering the means, without inconvenience or risk, of transferring the murderous gas into the gasometer, and thus to substitute fire-damp gas for coal-gas.

Adulteration of Wines.—The American Consul at Jerez de la Frontera states that the celebrated Jerez or sherries have had their reputation destroyed by the practice of adulteration now carried on. Wines from other localities are made up with Berlin spirits, and forwarded to market as Jerez brands. All wines must be more or less fortified with spirits, especially for exportation; but pure spirits of wine produced from the grape costs 97 pesetas per hectolitre, while Berlin spirits, produced principally from potatoes and laden with the deadly aemilic alcohol, costs only 30 pesetas, so that economical motives conduce to the employment of the latter for fortifying inferior wines which should be utterly condemned as a beverage. Unless the Spanish Government take steps to put a stop to the practice, it is believed that the present condition of the wine trade must continue from bad to worse, and every day witness increase of the discreditable practice of adulteration. The authorities in Spain would do well to follow the example of the Municipal Chemical Laboratory of the city of Montevideo, who are vigorously attacking the adulterators and falsifiers of wine in Uruguay. A prominent merchant who was proved to have taken part in these frauds was recently imprisoned, and nearly 60,000 litres of a liquid which was absolutely poisonous were seized and thrown into the sea.

Sale of Gas Shares.—Thirty-nine £10 shares in the Irvine Gas Light Company were exposed to sale by public roup, and brought £21. 3s. to £21. 8s. each, sums hitherto unprecedented. The shares were exposed by Mr. James Dickie, town clerk, as executor of the late Miss Balsillie.

Destruction of English Tobacco.—The tobacco grown last year by Lord Harris, at Belmont, Faversham, was, on Thursday, December 1st, destroyed by order of the Inland Revenue, because it was considered unfit to pay the duty.

Manufacture of Basic Slag Manure.—It is stated that some important extensions have been carried out at the North-Eastern Steel Works, Middlesbrough, for the production of basic slag manure. During one week no less than 800 tons have been manufactured, and this will be the weekly output by the North-Eastern Steel Company for some time to come. The firm, we learn, have a contract with Messrs. H. and D. Albert, large German manufacturers of artificial manures, for 40,000 tons of basic slag manure for a year, and this order has involved the laying down of extensive and costly plant.

Composition of Fire-clay.—A correspondent asks us to point to a recent analysis of fire-clay. The following are the results of an analysis of clay from the Shibden mines, near Halifax in Yorkshire:—

	Band Fire-clay.	Hard-bed Fire-clay.
Silica	67·90	66·25
Alumina	26·82	28·54
Per-oxide Iron	3·35	3·10
Lime	·42	·46
Magnesia	·59	·65
Potassa	·49	·47
Soda	·13	·16
Titanic Acid	·30	·37
	100·00	100·00

Re Siddeley and Co.—These bankrupts, Joshua and John Siddeley, who were engineers, brass founders, and coppersmiths, in Upper William-street, Liverpool, came before the court on their adjourned public examination, and were represented by Mr. Morton (Messrs. Avison, Paxton, and Co.); Mr. B. H. Newman appeared on behalf of Mr. Robert Jones, trustee; and Mr. Grier for the petitioning creditor. Mr. Newman briefly examined Mr. Joshua Siddeley as to several claims which had been made against the estate, and in regard to which there were disputes. Also as to the bankrupt's possession of shares in the General Ice Factory Company Limited, the North-Western Ice Company, and the General Ice Company Limited. The examination was formally adjourned to Monday next for the purpose of being then closed.

The Borax Company Limited.—The prospectus of the Borax Company Limited makes its appearance with the enormous capital of £1,325,000, divided into £675,000 deferred shares and £325,000 ordinary shares—both classes of the value of £10 each—and £325,000 6 per cent mortgage debentures of £100 each to bearer, and redeemable at £120 each by cumulative drawings. Applications are now invited for £175,000 deferred shares, and the whole of the debentures and ordinary shares. For the information of our readers we may mention that the borax mines which this company proposes to acquire are capable of yielding 7,000 tons of borax per annum from the present workings and adjoining beds, which have been tested, and which experiments show most favourable results. This company will practically obtain the monopoly for the supply of this mineral, and considering the demand which has sprung up for it of late years for the reduction of precious metals and copper smelting, the glazing of pottery, chinaware, bricks and tiles, the manufacture of electro-plate and jewellery, and in the manufacture of glass, and the preservation of meat and other perishable animal substances, its operations should be attended with a marked success.

THE PARIS EXHIBITION OF 1889.

A correspondent, who evidently knows what he is writing about, utters a few words of timely warning to intending exhibitors respecting the forthcoming Exhibition at Paris in 1889. If we may believe him, the undertaking is not of the *bonâ fide* nature that Exhibitions generally are. He says that the Exhibition of 1889 is only semi-official; the chief responsibility does not lie with the French Government, but is vested in a close corporation of industrial speculators. The buildings are progressing very slowly, and it is very doubtful whether they will be ready by 1889, particularly as money is scarce, and there is continual dissension among the administrators. All Governments have refused to participate officially, and Italy alone has conceded a small fund for the protection of its possible exhibitors, as France is the principal consumer of Italian products. Not one other country has as yet turned a hand to take part in it. Unfortunately, many of the originators of the Railway Jubilee Exhibition, of evil repute, are interested in the Exhibition of 1889, and these are nearly all of them men of no particular profession, merely picking up chances here and there, or waiting for something to turn up. As taxes are excessive in Paris, and trade is unusually dull throughout France, there are numberless poor in the city who must be kept busy, and something must be done to attract strangers and produce a temporary change in trade; therefore, the project of this Exhibition. It is a vast undertaking, and in the way people are wont to work in France, gives employment to an army of men; and, later on, it will not only occupy thousands in attending to stands, but it will no doubt attract numberless strangers. But it is not an Exhibition; it is a French bazaar and project of entertainment for the benefit of themselves alone, entirely at the expense of strangers. With the unsatisfactory state of affairs in its internal management, and the absolute lack of sympathy from all foreign Governments, boards of trade, and corporations, there is the greatest probability that the Railway Jubilee Exhibition will be only repeated on a larger scale in 1889, and it would indeed be well to warn all of our countrymen against wasting their time and money, as no good to them can possibly come of it. This is leaving out of consideration the political factor, which, with the French, may upset all arrangements.—*Iron.*

THE LIVERPOOL MINERAL MARKET.

The market has continued fairly brisk during the week, and prices remain without material alteration. Manganese: Imports are practically unchanged, and prices remain unaltered. Magnesite (containing 98 per cent of carbonate of magnesia) without change at 30s. to 35s. for raw lump; raw ground £6. 10s., and calcined ground £10 to £11. Bauxite (Irish Hill brand) in fair demand at full prices. Lump quoted at 20s.; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals have been small this week, and although there has been more doing prices remain without change—namely, 85s. to 90s. for medium, and 95s. to £5 for best GGB. Barytes (carbonate) still continues scarce, especially for carbonate; selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, GGB brand, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone is steady; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Iron ore continues quiet. Bilbao and Santander, 7s. 6d.; Irish, 10s. Purple ore, 6s. Emerystone quiet, at £5. 5s. to £5. 15s. for lump; smalls, £5. Fluor and felspar unaltered. Fullers' earth quiet; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. Wolfram and tungstate of soda continue quiet. Tungsten metal at 2s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore There is more inquiry, but prices remain unaltered at 80s to 85s. for 50 per cent, and 55s. for 40 per cent. Antimony ore, £8 to £10 for fair quality; £18. 10s. Antimony metal, £31 to £32. 10s. Uranium, 29s. to 32s. 6d Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potter's lead: Smalls, £10. 10s.; selected lump, £12. 10s. Calamine quiet, 60s. to 80s. Strontia steady: sulphate (celestine), 18s. 6d. Carbonate (native), £15 to £16; powdered (manufactured), £11 to £12. Limespar Ground, at 45s. to 50s. Plumbago: Best Ceylon lump is £25 to £35; good, £20 to £21; chips, £8 to £16; best ground, £20, £25, and £30; other qualities, £4 to £12 per ton. French sand, in cargoes, 16s. to 17s. Ferro-manganese: 80 per cent packed, £11. 2s. 6d.; 70 per cent packed, £10; 60 per cent packed, £8. 16s.; 50 per cent unpacked, £7. 15s.; 40 per cent unpacked, £7. 5s. Spiegel, 20 per cent, £4. 12s. 6d. Silicon spiegel, 9 per cent, £8. Chrome pig, 9 to 10 per cent, £8 to £8. 10s. Bitumen, finest picked, £35; original prime, £18 to £23; and good, £8.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

The market has been a quiet one all the week, looked at as a whole, and the price changes are few and none of them striking, if the still unchecked advance of sulphate of copper be left out of the count. Soda crystals are falling, as might have been expected from the season of the year and the closing up by ice of a good many of the north of Europe outlets. Although makers' stocks are rather small than otherwise, still the other time influences outweigh this circumstance, and we look for further dropping yet awhile. Under the action of a weakening demand, both for spot and forward, the Scotch makers of sulphate of ammonia are giving way still, and to-day's legitimate quotation is not higher than £11. 10s. f.o.b. Leith—perhaps £11. 7s. 6d. is nearer the mark—on a slowly declining market, and that in spite of makers' stocks not being very large. Paraffins generally firm, and the manufacture all round healthier of look now. Bleaching powder is firm at a fractional rise, and bichromates, at the old prices, continue to get rather more into demand. General prices current are:—Soda crystals, 42s. 6d. net Tyne; alum, £5, less 2½ % Glasgow; borax, English refined, £31, and boracic acid £46 net Glasgow; soda-ash, 48/52°, 1d., less 5 % Tyne; caustic soda, white, 76° £9. 5s., 70/72° £7. 5s., and cream, 60/62° £6. 2s. 6d., less 2½ % Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52° 1½d., less 2½ % Tyne; saltcake, 21s. f.o.r. Glasgow; bleaching powder, £8 to £8. 2s. 6d. f.o.r. Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5 and 6 % to Scotch and English respectively; nitrate of soda, 8s. 9d. to 9s.; chlorate of potash, 6d., less 5 %; sulphate of ammonia, £11. 7s. 6d. to £11. 10s. f.o.b. Leith; paraffin scale, hard, 2½d., soft, 2d.; paraffin wax, 120° semi-refined, 3d., and re-melted 2¼d.; naphtha, 7½d.; burning oil (mineral), 5d. to 6d.; lubricating oil (mineral), 865° £5. 10s., and 885° £6. 10s. to £7; sulphate of copper, £20, less 5 % Liverpool. Last week's Clyde imports included 46,015 bags sugar (Greenock), and 300 tons pyrites (Glasgow).

THE ALKALI TRADE.

Leblanc soda-ash has been selling rather more freely, and prices on the spot have hardened a little. Any permanent improvement in values is, however, hardly to be hoped for, inasmuch as the ammonia-soda is being still placed on the market at extremely low prices. There are now several works making alkali by the ammonia process,

etition for orders is tolerably keen. Bleaching eps firm, and manufacturers are busy with home t orders for some time to come, so that unless a put is agreed upon there is no early prospect of e in values. £8 per ton f.o.b., and corresponding rails Lancashire, is about present value.

e of potash has improved. There is a good and price has advanced, 6 1/16d. to 6 1/8d. now being Muriatic acid, chloride of magnesium, and sulphur are in good request.

MISCELLANEOUS CHEMICAL MARKET.

products all round are dearer. The advance in of fully £2 per ton has affected the prices of which for leading brands is now quoted at £17. 10s. White and brown acetates of lead have moved a little, but not in corresponding degree, owing to all demand for these products. Nitrate of lead well at £22. 15s. to £23. Copper and sulphates : Copper oxides, &c., are again dearer all round. es of lime and soda are firmly held, and there is k for lower prices in these products. Acetic acid off freely. The demand for coal-tar products good, and prices are well maintained. Solvent sells at 1s. 2d. per gallon. Benzol, nominally as of prices current. Crude naphtha and creosote nd buyers at fair prices.

ing powder makers are well engaged with orders, is well maintained at £7. 12s. 6d. f.o.r. at works shire and Tyne district. Caustic soda and soda- ithout any important change.

e of ammonia is selling freely at £22 a ton, and is firm at recent quotations. Upon the whole, firmer tendency in prices.

THE TAR PRODUCTS MARKET.

L is reported weaker, and though prices nominally without change, there is little or no business Aniline products are dull, and the aspect of the hardly favourable to a continuance of recent tactics to advance the prices of benzol.

of crude naphtha continue to find a ready outlet article, and there are buyers for 1888 delivery at es. Solvent naphtha can be bought at slightly tes for spot delivery. In quantity, 1s. 2d. is about price at makers' works. Crude carbolic is still change, but there is no disposition on the part of go far ahead. The increased production of the months may be fairly expected to bring about a in price in the absence of any special demand crystal carbolic or other products. Creosote is off very readily, and sellers find no difficulty in g full prices.

E SULPHATE OF AMMONIA MARKET.

ast week has not witnessed any important fluctua- price, and upon the whole the market remains material change in any of its aspects. Prices are ed respectively at £11. 10s. and £11. 12s. 6d., all and London, and sellers show no disposition to orders at lower rates. This firmness on the part generally will doubtless have its effect upon those terest in prices lies in the opposite direction.

TY OF CHEMICAL INDUSTRY.—We hear on good y that the Journal of this Society is to be taken m Manchester. The printing has been given to Eyre and Spottiswoode. We sincerely trust it will r by its removal, but we have our doubts.

THE PATENT LIST.

The following list has been compiled expressly for THE CHEMICAL TRADE JOURNAL *by* G. F. REDFERN & CO., *Patent Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

16254. THE TYNE ALKALI COMPANY (Limited) and T. GIBB. For improvements in the treatment of solutions containing barium or strontium compounds, and the obtainment of products therefrom. Nov. 25.

16301. I. LEWKSWITSCH. For improvements in the extraction of organic bases from the distillates of coal and shale tars. Nov. 26.

16453. J. A. WANKLYN, H. M. MACLURE, and W. A. BYRNN. For smokeless gunpowder. Nov. 30.

16484. J. Y. JOHNSON. A communication from The Farbenfabriken vormals, F. Bayer and Co., of Germany. For improvements in the manufacture of azo dyes. Nov. 30.

16493. J. Y. JOHNSON. A communication from the Farbenfabriken vormals, F. Bayer and Co., of Germany. For improvements in the manufacture of azo dyes. Nov. 30.

COMPLETE SPECIFICATIONS ACCEPTED.

417. A. M. CLARK. A communication from S. G. A. Depont, of France. For an improved manufacture of artificial ivory. Jan. 11, 1887.

737. O. IMRAY. A communication from The Farbwerke vormals, Meister, Lucius and Brüning, of Germany. For manufacture of colouring matters by the action of nitro-soderivatives of secondary aromatic amines upon phenols and oxycarbonic acids. Jan. 17, 1887.

955. H. H. GUNN. For improvements in the manufacture of sulphide of zinc white. Jan. 21, 1887.

1276. E. CLEAVER. For improvements in the manufacture of aluminium and aluminium alloys. Jan. 26, 1887.

1291. N. M. HENDERSON. For improvements in apparatus for treating or purifying paraffin wax. Jan. 27, 1887.

Letters Patent have been issued for the following:—

14407. O. M. THOWLESS. For improvements in the manu facture of aluminium chloride, and in the extraction of aluminium therefrom. Nov. 8, 1886.

14711. J. SIMPSON and E. W. PARNELL. For improvements in apparatus for use in the treatment of sulphuretted hydrogen for the separation of sulphur, or for the production of sulphurous acid. Nov. 13, 1886.

15182. E. T. ALEXANDER. A communication from E. J. L. Delsol, of France. For a process for obtaining mother liquids free from magnesian salts in the manufacture of carbonate of potash by means of the double carbonate of potash and magnesia. Nov. 22, 1886.

11492. H. H. LAKE. A communication from A. Kayser, H. Williams, and A. B. Young, of the United States. For improvements relating to the production of caustic alkali carbonates of the alkaline metals, muriatic acid, and other substances. August 23, 1887.

11493. H. H. LAKE. A communication from A. Kayser, H. Williams, and A. B. Young, of the United States. For an improved method or process of producing silicate of sodium or of potassium. August 23, 1887.

11494. H. H. LAKE. A communication from A. Kayser, H. Williams, and A. B. Young, of the United States. For an improved method or process of producing muriatic acid. August 23, 1887.

Specification published, 1887.

12486. O. M. THOWLESS. Producing sodium and potassium, &c. 8d.

The Chemical Trade Journal,

SATURDAY, DECEMBER 17, 1887.

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TO ADVERTISERS.

SPECIAL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

In the first week of the approaching New Year we shall issue a **SPECIAL NUMBER** of the Journal. We propose to bring our first volume to a close with the last Saturday in December, 1887. The issue of January 7th, 1888 (No. 33), will commence Volume II. It will be an enlarged special number of very general interest. We shall issue along with it a Title-page and Index for the first volume, together with a neat and useful Office Almanac, suitable for our subscribers, which is now in course of preparation.

Including our regular subscribers, our New Year's Number will be issued to **NOT LESS THAN 10,000 FIRMS AND INDIVIDUALS**, so that intending advertisers will see at once that this issue is worthy of their special attention.

We may explain that, in our Publishing Department, we possess very carefully-compiled lists—in most cases the result of special knowledge and information at our command—of every firm of repute, both at home and in the main trading centres abroad, connected with the various industries whose interests it is our province to serve. We utilise these lists week by week, by selecting a number of them in turn, and sending out free copies of the Journal to those firms who have not yet become annual subscribers. The result is that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of New Year's Special Number we shall **MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO**, numbering altogether, as we have stated, not less than 10,000 names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

Legal.

Several correspondents have inquired whether we propose to publish a verbatim report of the action-at-law, A. G. Kurtz and Co. *v.* Peter Spence and Sons, seeing that it is of considerable importance to all manufacturers holding chemical patents. The evidence was taken at considerable length, and, though we desire to give as full a report as possible, it can only be done by spreading it over several numbers of the *Journal*.

. . . . .

DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ & CO. *v.* PETER SPENCE & CO.

On Monday the 5th inst., in No. 4 Chancery Court of the High Court of Justice, before Mr. Justice Kekewich, the above case came on for hearing. Mr. Moulton, Q.C., and Mr. Lawson appeared for the plaintiffs, being instructed by Messrs. G. R. Rogerson and Co.; and Mr. Aston, Q.C., and Mr. Chadwyck Healey for the defendants, instructed by Mr. E. Robinson Walker. The case in point is a most peculiar one. From Mr. Aston's opening speech we learn that on the 11th August, 1882, Mr. Peter Spence applied for letters patent for a "Process for the removal of oxide of iron from a solution of sulphate of alumina." The ordinary way of making an alumina salt free from iron has been to form it into potash or ammonia alum, and this being an expensive operation it was endeavoured to replace it by some other system. The invention referred to consisted in adding to the neutral solution of sulphate of alumina some fully oxidised peroxide of manganese, and by the agency of this material the whole of the iron can be removed from the solution. It appears that Mr. Spence's specification was accepted, and he was granted provisional protection for his invention, after which he perfected the process, and finally obtained the seal under the old Patent Act. After he had obtained the seal, he noticed that a patent had been applied for under the name of J. W. Kynaston, for what he thought was precisely the same purpose as his own, and therefore he opposed the sealing of Kynaston's patent, and after a lengthy hearing before the law officer of the Crown, patents were granted to both individuals—with this distinction, however, that, whereas Mr. Spence's retained its original date, the date of Mr. Kynaston's was altered so that it would appear to have been taken out one day after Mr. Spence's, although in reality it was deposited a day before.

How this has worked may now be seen. Mr. Kynaston endeavoured to dispose of his patent to Messrs. Kurtz and Co., and Messrs. Peter Spence and Co. hearing that Messrs. Kurtz were about to commence the manufacture of Kynaston's patent, wrote to them, stating they must not manufacture by means of peroxide of manganese, as that was their process, and they would certainly defend their rights. An interview took place between Messrs. Spence and Kurtz, but no arrangement or settlement was entered into. Under a certain clause of the new Patent Act Messrs. Kurtz and Co. have compelled Messrs. Spence to bring about the present action, and they have moreover been successful so far, not only with regard to the threatening clause of the new Act, but in the Court of Appeal they have managed to get the question of validity introduced, so that not only have Messrs. Spence to prove infringement, but have also to show that they hold a good and valid patent. The whole of the first day and part of the second was taken up with the argument of the learned counsel, in which he endeavoured to show that within the meaning of the Act there had been no threats, and in the second place that there had been an infringement by Messrs. Kurtz of the defendants' patent.

The first witness, Mr. George Edward Davis, Fellow of the Institute of Chemistry, consulting chemical engineer, and editor of the *Chemical Trade Journal*, examined by Mr. Chadwyck Healey, gave evidence as follows:—

OUR PRICE CURRENT.

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The values stated are F.O.R. *at Maker's works, or at usual ports of shipment in U.K. localities may vary.*

		£	s.	d.
ACIDS:—				
„ Acetic, 25 %	per cwt.	0	10	3
„ „ Glacial	per lb.	0	0	6⅞
„ Arsenic, S.G. 200°	per cwt.	0	11	6
„ Chromic 85 %	per lb.	0	0	4½
„ Fluoric	„	0	0	4½
„ Muriatic (Tower salts) 30° Tw.,	per bottle	0	0	7
„ „ (cylinder) 30° Tw. ..	„	0	3	0
„ Nitric, 80° Tw.	per lb.	0	0	2½
„ Nitrous	„	0	0	2
„ Oxalic	„	0	0	4½
„ Sulphuric (fuming 40 °/₀).. ..	per ton	12	0	0
„ „ (Brimstone 168°) ..	„	3	15	0
„ „ (Pyrites 168°)	„	3	5	0
„ „ (spent oxide 168) ..	„	3	17	6
„ „ („ 150°) ..	„	2	2	6
„ „ (Pyrites 150°)	„	1	15	0
„ Tartaric	per lb.	0	1	6½
Arsenic, white powdered	per ton	10	17	6
Alum (loose lump)	„	4	13	9
Ammonia, ·880 = 28°	per lb.	0	0	3½
„ = 24°	„	0	0	1¾
„ Carbonate	„	0	0	3½
„ Muriate	per ton	22	0	0
„ „ (sal-ammoniac) ..	per cwt	34/- & 32/-		
„ Sulphate (grey), London..	per ton	11	15	0
„ „ (grey), Hull ..	„	11	15	0
Aniline Oil	per lb.	0	0	9½
„ Salt	„	0	0	8½
Antimony	per ton	39	0	0
„ (tartar emetic)	per lb.	0	1	1½
Barium Chloride	per ton	7	10	0
„ Carbonate (native)	„	4	10	0
„ Sulphate (native levigated) ..	„	3	5	0
Bleaching Powder, 35 %	„	7	12	6
„ Liquor, 7 %	„	2	12	6
Bisulphide of Carbon	„	12	5	0
COAL-TAR DYES:—				
Alizarine (artificial) 20 %	per lb.	0	0	9
Magenta	„	0	3	9
COAL-TAR PRODUCTS:—				
Anthracene, 30 % f.o.b. London,	pr unit pr cwt.	0	1	3
Benzol, 90 % „ ..	per gallon	0	3	0
„ 50/90 „ ..	„	0	2	5
Carbolic Acid (crystallised 35°)	per lb.	0	1	[illegible]
„ (crude 60°) ..	per gallon	[illegible]		
Creosote (ordinary)	„	[illegible]		
„ (filtered for Lucigen light	„	[illegible]		
Crude Naphtha, 30 % @ 120° C.	„			
Grease Oils, 22° Tw.	per ton			
Pitch, f.o.b. Liverpool or Garston	„			
Coke-oven Oils (crude)	per gallon			
„ (refined)	„			
Copper (Cash)	per ton			
„	„			
„	„			
Glue	per ton			
Glycerine	„			
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Lime, Acetate (brown) .. .
„ „ (grey) ..
Magnesium (ribbon and w
„ Chloride ..
„ Carbonate .
„ Hydrate
„ Sulphate (
Manganese Sulphate
„ Borate ..
„ Ore, 70
Methylated Spirit, (
Naphtha (Wood),
„ „
OILS:—
Castor ..
Cotton-seed
Linseed .
Lubricatin
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water a
– about 350
nese is formed
this in the proporti
as able to extract from
by means of this peroxide
Dunlop process.
oxide of manganese an anhydro
se with a natural mineral?—Yes, as is t
ural mineral.
Dunlop process of making the peroxide w
s well known.
was it well known in 1882?—It was.
Have you prepared anhydrous peroxide of mangane
from the Weldon mud?—I have.
How did you prepare that?—I prepared that by treati
with bleaching powder solution.
Treating what?—Treating the Weldon mud with t
bleaching powder solution to thoroughly peroxidise i
washing it with dilute nitric acid to remove the impuritie
and then heating that to about 500 deg. C.
What was it you heated? You said you heated "that"?-
I heated the residue, which was hydrated peroxide
manganese, to start with.
You heated that to 500 deg. C.?—Yes.
And the effect of which was——?—To drive off th
water and to leave the anhydrous peroxide——
Was that peroxide absolutely anhydrous?—It containe
no water—by heating it and passing the gases through
water.
Did you make use of that in any of your tests?—I did.
With what result?—From 95 to 97 per cent wa
obtained of the iron from the sulphate of alumin
solution.

three tests, with the anhydrous
with the natural mineral;
natural mineral, I think
nt?—That is so.
That is so.
of the two
nd that
lum
1

Mr. Lawson: Now, you say that you have made several experiments with peroxide of manganese?—I have.

When you used those specimens of peroxide you say you got proportions of iron removed from the solutions?—Yes.

But in every case there was some iron left?—Yes.

Now, is it not absolutely necessary in this manufacture of sulphate of alumina that there should be no iron left?—No, it is not necessary.

What proportion do you say can be left?—About 7 per
t of the original iron that is present there.
, will you take Spence's specification in your hand,
nd first of all will you look at the provisional
and at the ninth line, "Our invention consists
n and other salts of alumina with but a
tion of iron and a coloured organic
r acting upon their solutions with
—Yes.
nvey to your mind that it
in any form?—Certainly.
n peroxide of man-

xide of manganese?—
hat is merchantable. I
the market at all.
d be obtained in any way,
tication which would tell you
de?—No, that does not tell me

a protoxide of manganese in the
n given in this specification that
hat for the purifying of solutions?—
t all why we should not use that for
ations. There is no reason at all why
e it if we could get it.
l get it would it be enough?—By treating
ng powder as well.
ing of the protoxide of manganese?—No, as
of manganese it would not be enough.
will you look at the final specification? In the
ree lines of that it states that they produce the
and other salts of alumina with but a very minute
portion of iron and of coloured organic impurity by
esting or acting upon their solutions with an oxide of manganese. Those are the words of the original specification. Then in the 15th line he says he adds to the solution peroxide of manganese in the proportion of six parts by weight of dry peroxide of manganese to every 100 parts by weight of dry sulphate of alumina cake contained in such solution. Such peroxide of manganese they form artificially in a mode similar to the production of Weldon mud?—Yes.

How could you produce peroxide of manganese in a mode similar to the production of Weldon mud?—By following the processes that I have described to his Lordship.

But that is producing Weldon mud?—That is producing Weldon mud.

But I ask you how would you produce peroxide of manganese in a mode similar to the production of Weldon mud?—Because the Weldon mud made hitherto has only been used for the preparation of bleaching powder. I am not aware of any process of manufacture by which Weldon mud has been produced for this purpose.

I do not think I make myself clear to you. What I ask you is, putting aside the actual Weldon mud itself how could you produce peroxide of manganese in a mode similar to the production of Weldon mud? How would you start?—By dissolving it in muriatic acid.

By dissolving what?—Any oxide or peroxide of manganese in hydrochloric acid, then by throwing it down with lime and blowing air through it and allowing the oxidised oxide of manganese to settle, and then it will produce an oxide of manganese similar to Weldon mud.

But the question you are asked is how would you

this
as a
up now.
Weldon
sold—No,
oxidised.

to the composition
the active principle
other oxides.
e. I ask you as a
of Weldon mud?—A
protoxide of manganese,
of peroxide of iron, a
l with a solution of chloride

oxides also present?—Do you
nese? There is a protoxide

: You mentioned that before as
then Mr. Lawson asked you are
nes in addition to those mentioned?
ower than protoxide.

duce peroxide of manganese made similar to Weldon mud?—By the method I have just stated.

Would that peroxide of manganese be hydrated or anhydrous?—Hydrated peroxide of manganese.

Then the specification goes on to say that it "should be fully oxidised by modes well known." I presume that means that the peroxide of manganese is to be fully oxidised by means well known. What do you understand by those words? You have described one way, are there any others?—Yes, there are others. It has long been known that by treating manganese a little longer with a weak solution of ferrocyanide of potassium the protoxide of manganese will absorb more oxygen than it will unless it has been treated with the ferrocyanide. That is the second process.

Did you ever know of Weldon mud being practically treated with chloride of lime in that way and then sold?—I have never known any Weldon mud sold at all. It is generally dealt with in the works; I have dealt with thousands of tons of it, and I have never known an ounce sold.

You have described a mode of oxidising Weldon mud, how is it done?—By oxidising it we make bleaching powder, which would be absurd—it is used to make bleaching powder, and then to use the bleaching powder back again to oxidise the mud would be absurd.

Could it be used commercially under this patent?—Yes, sir.

But as a matter of fact it never was done practically before this patent?—I have used it myself for laboratory experiments, fully oxidised.

But you do not know that it was ever done on a practical scale?—No, I have not heard of it.

Now going to those words, "such peroxide of manganese we form artificially in a mode similar to the production of Weldon mud," do you say that Weldon mud and peroxide of manganese are the same thing?—Hydrated peroxide.

Yes, is that the same thing as Weldon mud?—It is the same thing except the impurities that are with it; it is not absolutely pure per-oxide of manganese.

What is the chemical composition of peroxide of manganese?—Theoretically it is $Mn\,O_2$, but I have never yet met with a sample quite pure.

Weldon mud is pure peroxide of manganese plus something else?—Yes, with other oxides.

Weldon mud is merely a mixture of peroxide of manganese and lime, is it not, chemically combined as an oxide of manganese and lime?—That is a moot point amongst chemists,—it is not fairly recognised that it is so.

Is it not a fair thing to say that the composition of peroxide of manganese and lime may be construed as actually chemically combined, lime being the base?—I do not think it is fair to say so.

But does not Weldon mud always as a fact contain peroxide of manganese and lime, not as a mixture, but combined?—It always contains some base, but we do not know how far combined at all,—nobody has ever told us that.

But they are there as bases?—They are as bases certainly.

And protoxide of manganese is also there?—Protoxide of manganese is.

And is also there as a base?—Yes, sir.

So you may say that Weldon mud is a manganite of lime plus a manganite of manganese?—No, I would not say so; nobody has proved that those compounds are manganites,—it is only theory.

But the protoxides of manganese are there?—Yes, and in the native oxides.

So that as Weldon mud contains peroxide of manganese plus lime plus protoxide of manganese, it would not be right to say that Weldon mud and peroxide of manganese are synonymous terms?—As we know things commercially it would be, because the peroxide of manganese that we know commercially contains all those things.

But speaking as a chemist?—Yes, speaking as a chemist I should say they are both the same thing, because there is protoxide of manganese present in the native oxide, and there is iron also there, and we might as well say that the native ores contained manganites as well as Weldon mud.

What is present in the native ore of peroxide of manganese?—From 40 to 80 per cent.

And protoxide of manganese?—From 30 down to 7 per cent.

That is of the protoxide?—Yes, sir.

By native ore you mean a mineral known as pyrolusite?—I mean what is bought for use in the chlorine manufacture, to generate chlorine, as peroxide of manganese.

I was speaking of the native peroxide of manganese?—And I am speaking of the native peroxide.

And that is called pyrolusite?—I do not know what it is called, only an oxide of manganese.

Now look at the 35th line of that specification: "The peroxide of manganese, when washed free from the solution before referred to, may either be thrown away, or if found desirable it can be dissolved and converted into Weldon mud, as is well known." Does not that point to the fact that peroxide of manganese is one thing and Weldon mud another?—Yes, it points to it in a physical condition.

But not in chemical condition?—Not in chemical action.

Then do you mean that you can take peroxide of manganese and convert into the same thing chemically—you cannot mean that?—Convert it into the same thing?

Yes, you have told me that peroxide of manganese is the same thing as Weldon mud, but the patentee says that the peroxide of manganese may, if found desirable, be converted into Weldon mud. I should have thought he meant by that that Weldon mud and peroxide of manganese were two different things. Do I understand you to say that peroxide of manganese and Weldon mud are the same thing?

Mr. Justice Kekewich: Look at the words, Mr. Davis, and then you will see what the learned Counsel means?—Yes, I can see what is stated.

Mr. Justice Kekewich: I do not think the witness understands you, Mr. Lawson; let me assist you.

If Weldon mud is the same thing as peroxide of manganese, the sentence may be read thus: The peroxide of manganese, when washed free from the solution before referred to, may either be thrown away, or if desirable, it can be dissolved and converted into peroxide of manganese?—That is so, my lord; if you dissolved it up again you would get Weldon mud again.

Mr. Lawson: You are familiar with the Weldon patents, I presume?—I am.

Do not you know that the title he gave to this Weldon mud was manganite of calcium?—Not in his original patents.

I am speaking of an article which appears in the *Chemical News* of the 3rd September, 1869, on the manufacture of chlorine by means of perpetually regenerated manganite of calcium; by Walter Weldon, Member of the Chemical Society?—I should be glad if you would allow me to refer to the patents with reference to his process. I believe it is referred to in a patent in which he describes it as regenerated oxide of manganese.

The words are, "the manufacture of chlorine by perpetually regenerated manganite of calcium," that is the description here?—Yes, sir.

Then when Mr. Weldon used the words "manganite of calcium" as an expression which would be understood, that which he termed "manganite of calcium" is what is now termed Weldon mud?—When he patented it he described it as peroxide of manganese.

But this was before the patent, I understand?—That was a paper read before the British Association, I believe.

But is it not a fact that Mr. Weldon himself did call

after | has been isolated?—I do not know whether that has been isolated, but I should like to qualify one thing, my Lord. I like to say that it is not necessary for the purposes

No, you must not say that.
on either manganic acid

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I understand, reading the
ng which is to be carried

of permanganic acid in a
—I have, mixed with other

if?—No, I have not. I have
—not an ounce.
acid?—Not in a pure state.
?—Yes, when it is mixed.
been isolated?—No.
I thought he told us before that
elf, and he cannot tell us that

not seen it, my Lord.

Mr. Justice Kekewich: He confesses as far as he knows that it has not been isolated.

Mr. Lawson: Now, if you start from permanganic acid alone, can you produce peroxide of manganese? Assuming, I suppose, sir, that I could get pure manganic acid.

But then the specification says that the claim is for the use of manganese combined with oxygen, as peroxide, whether produced—from permanganic acid, &c.- could that be done?—It could be done from permanganite of potash.

I ask, could it be done from permanganic acid pure?--I have never seen such a thing, and I do not know its reactions at all. I do not know anything about pure permanganic acid.

And you would say the same with regard to manganic acid?—Yes.

Now, with regard to what you stated this morning, when you made peroxide of manganese from Weldon mud, you could remove 95 per cent of iron. Do I understand that you removed the whole of the iron?—No, not the whole of the iron.

How much did you leave?—About 7 per cent.

But is it not necessary that the whole of the iron should be removed?--No, it is not necessary.

Is not the patent for removing the whole of the iron?--I do not think so, if you would allow me to read the specification.

Mr. Aston: It says, "With a very minute proportion of iron."

Mr. Lawson: Then, you consider 7 per cent a minute proportion of iron?—I do.

Mr. Justice Kekewich: Would you go further and say it is a very minute proportion?—It is, my Lord; it is 7 per cent of the total iron in the liquor to start with, not 7 per cent in 100 parts of the alum cake; but if there is 1 per cent of iron in the liquor to start with, we take 93 per cent of that out, and leave 7 per cent of that 1 per cent.

Mr. Lawson: Now, in Spence's specification they say "the alum thus produced is of an exceedingly high degree of purity." Would you say that if 7 per cent of the iron was left, it would be in a high state of purity?—I should consider that it was very pure indeed.

Now, would not that be too high a proportion for dyeing operations?—No, not for many purposes. In some it would be detrimental, but not in the majority.

Do I understand you to say that in the majority of dyeing operations 7 per cent is not too large a proportion?—No, it is not.

This sulphate of alumina acts the same part as alum in dyeing operations, does it not?—Yes, it will do; but as a rule it is not used for that purpose.

Then is not the object of obtaining this pure sulphate of alumina to replace the alum in dyeing operations?—I do not know what its use is in that way.

Is it not the fact that the object of getting the pure sulphate of alumina is for it to be used in dyeing operations?—It may be so, but I was under the impression it was for paper-making; I may be wrong, but that was my impression.

If asked to get a very pure sulphate of alumina would you say that was a pure sulphate of alumina with 7 per cent of iron left in it?—I should not say with 7 per cent left in it. There is a wonderful difference between 7 per cent in it and 7 per cent of the original iron left in.

Do you know how much iron you commence with?--Yes.

How much?—About one gramme per litre; that is one ounce in the cubic foot.

Is that what is in the liquor of the bauxite?—Yes, that is what is in liquor to start with.

Does not that vary?—Yes, some will be a great deal less than that.

Will not some be a good deal more?—I do not think so, because that kind would not be used in the manufacture.

Now, just look at that claim in Spence's specification; does not that claim every possible mode of obtaining manganese combined with oxygen as peroxide of manganese?—I do not think so.

First of all, it is to be produced from lower oxides by oxidation, and then from manganic and permanganic acid by deoxidation?—Yes.

What other ways can there be?—There is the Dunlop process, where carbonate is made into a peroxide.

Is not that the oxidation of a lower oxide?—It is a carbonate.

But it is a production from a lower oxide by oxidation, is it not?- Not if you take it from the starting point.

Must you not have oxygen there?—Yes, you must have oxygen.

Then there is oxidation?—Yes, but it is carbonated. You start with the carbonate.

And the carbon contains carbonic acid?—Yes.

And it loses that?—Yes, it must lose that or the carbon in some way.

And is not that oxidation?—Yes, but it may take place simultaneously—it may lose carbonic acid and pick up oxygen at the same time.

Re-examined by Mr. Aston.

Now, going back to the Weldon mud process, when you begin with peroxide of manganese and you convert it into Weldon mud, you first treat it with hydrocholric acid, drive off the chlorine, and get a chloride of manganese residuum?—Yes.

You then add lime in excess and blow air through that, and get a protoxide of manganese which you convert into peroxide of manganese again?—Yes.

And in that case you have converted the protoxide into Weldon mud?—Yes.

Now, you were asked whether in line 35 of Messrs. Spence's specification the peroxide of manganese as there referred to would be, would it not, in the solution of alum or sulphate of alumina and it would be what would be thrown down?—Yes.

And we are told that if it were washed free from the solution it would be the sulphate of alumina solution from which it had been separated?—Yes.

Then it could be dissolved and converted into Weldon mud again?--Yes.

What would you dissolve it in?—In hydrochloric acid.

That would give you chloride of manganese, would it not?—Yes.

And chlorine and water?—Yes.

Therefore the chloride of manganese obtained from that residual peroxide of manganese you could convert into Weldon mud, could not you?--Yes.

By doing what?—By adding an excess of lime and blowing air through it.

In that case you could use the peroxide of manganese in a continued cycle of operations, the same as you could use the peroxide of manganese for the production of chloride by a cycle of operations?—That is so.

Therefore it is true, is it not, as you have just now explained to my Lord, that the peroxide of manganese with which you start can be converted into Weldon mud?—Yes.

And when in the form of Weldon mud the protoxide of manganese contained therein can be again converted, and is converted, into peroxide of manganese?—Yes.

Now, you were asked whether, if you used that oxide of manganese, that by itself would mean Weldon mud. Is Weldon mud something in which there is an active agent as regards the purposes for which it has to be employed in this specification?—Yes.

What is the predominant active agent in the Weldon mud?---Hydrated peroxide of manganese.

Is that an oxide of manganese?—Certainly.

Then you were asked whether the words in line 9 of the specification, "Acting upon their solutions with an oxide of manganese," would mean Weldon mud. I ask you whether that is inconsistent with Weldon mud being em-

No, certainly not. I think it is the thing which employed.

next question to which I will call your attention unded upon the following words at page 2, lines vards:—"We add to the above-named solution he solution of bauxite treated with hydrochloric rming a solution of sulphate of alumina—per-anganese in the proportion of six parts by weight xide of manganese to every 100 parts by weight hate of alumina cake contained in such solution. ide of manganese we form artificially in a mode the production of Weldon mud." Now, suppose esidual bleaching liquor?—Yes.

but the residuum in the manufacture of chloride which reference is made?—Yes.

hat would that consist of?—Chloride of man-

ppose you wanted to manufacture from that manganese peroxide of manganese artificially, know how to do it?—Yes.

anyone acquainted with the chloride of lime re know how to do it?—Yes, everyone.

hortly what would be the operations that would gone through if you want to manufacture per-anganese from the bleaching liquor residuum, shortly as you can?—The solution of chloride ese would be taken, and lime added to it in ess. Then air would be blown through the til the buff colour of protoxide of manganese ed in the black peroxide of manganese, and llowed to settle, and the watery solution is run g mud at the bottom of the vessel, which is ud.

that operation perfectly well known at the time ent?—I should think it was in operation in every powder works, without exception, in the United

n operation in 1882?—Yes.

u were asked whether Mr. Weldon, in his specifi-869, did not speak of his production as manganite , and you said you thought there was a prior n of 1868. Will you look at that (*indicating*), e if that is what you referred to? (*Document witness*).—Yes, this is the one.

at does he speak of producing in the specifica-8?—Regenerated oxides of manganese.

oes he mean and what would be understood in phrase "regenerated oxides of manganese?"—anese that was used once in the operation could d and used *ad infinitum*.

describes the operation which you have referred ducing peroxide of manganese, does he not?—ication does.

ou be good enough now to read what are the le in claims 19 and 21 of that specification by Read them aloud, please?—No. 19 is: "The of very rich artificial peroxide of manganese by th air, by any of the methods mentioned above h 29. A mixture of recovered oxide of man-e lime solution of chloride of calcium or any ble liquid."

t rich peroxide of manganese there referred to ing such as you have referred to here before to-day?—It means exactly the same thing. 21 is: "The use of the peroxides or artificial anganese, which have been recovered by means the particular methods which are set forth above h 30, and of the agents other than the atmos-, to which also mention is made in that "

at refer to the same production?—The same

r. Davis, whether the condition of the peroxide ese in the Weldon mud or its analogue has been properly defined by chemists or not, have you any doubt what the peroxide is really for?

Mr. Moulton: This is really leading—"Have you any doubt."

Mr. Justice Kekewich: In re-examination it is very difficult to avoid it.

Mr. Aston: I am putting the question really put on the cross-examination.

Mr. Justice Kekewich: I did not see the force of the cross-examination, and therefore I do not see the force of the re-examination. Ask the question for what it is worth.

Mr. Aston: In the Weldon mud is there present oxide of manganese in the form of peroxide? Yes.

Have you used Weldon mud for the purpose of capturing and removing iron from sulphate of alumina solutions in your experiments?—Yes.

In those portions of Weldon mud which you have used, are you able to tell my Lord which was the active agent that enabled you to recover and separate the iron?—The hydrated peroxide of manganese.

Have you any doubt of it?—No doubt whatever.

Mr. Justice Kekewich: I should have been very much surprised if he had any doubt, because he has sworn to it several times.

Mr. Aston: Now, you have been cross-examined as to the claiming clauses. Is there described in the body of the specification a known process of producing the peroxide of manganese from the lower oxide by oxidation?—Yes.

Then the claiming clause goes on to say, "It may be produced from manganic acid or permanganic acid or their salts by deoxidation;" do you as a chemist understand that?—Yes.

In what form is the lower oxide in the Weldon mud when it is made into the peroxide?—The protoxide.

I think you told us that it is associated with other impurities in that form?—Yes.

Is there any difficulty in treating the protoxide so as to convert it into peroxide, though it is associated with other matters?—None whatever.

Now take manganic acid. You have been asked whether that acid which is $Mn\,O_3$, or said to be ——?—Yes, said to be.

You were asked if you had ever seen it in an isolated form, and you said "No"?—No, I have not.

Do you know any bodies in which you are justified in saying that manganic acid is present?—Yes, certainly.

Give the names?—Manganate of soda, as was used in the case of the purification of the sewage of the metropolis.

Give us any forms of manganic acid that could be converted into peroxide by deoxidation?—From the manganate of soda.

You could deoxidise and bring it down?—Yes.

Is that known?—That is known perfectly.

Do you know of any other manganates?—Manganate of lime.

And you can bring that down in the same way?—Yes.

Now we go to permanganic acid, which is $Mn_2\,O_7$?—I believe it is said to be so, but it has never been isolated to my knowledge.

Have you known any substance in which you are justified in saying permanganic acid is present?—Yes.

Give us them?—Permanganate of potash.

Could you deoxidise it?—Certainly.

And form a permanganate from it?—Yes, sir, that is a regular analytical process.

Do you think, then, there is any difficulty in forming peroxide from the higher oxides?—No.

Or any difficulty in forming it from the lower oxides?—None whatever.

Either in forming it from the lower oxides by adding oxygen or from the higher by taking away oxygen, do you know any reason why it should not answer the purposes of the patentee?—It will answer.

must be strengthened
l 100 c.c. are exactly
ate.

which the test blue is
orks in his *sanctum*
result when used with
usually employed in
te usually employed is
of water; it is divided
to fifths. A pipette is
grains, and also 100

e shall not endeavour
those who know, an
blue" will be of some
ourselves open to the
empirical and unsatis-
y introduced it to give
ison with a better one.
cinormal ($\frac{N}{10}$) solution
w called scientifically
odide of potassium solu-
the iodide in 100 c.c. of
olvent; and (*c*) a starch
rammes of starch in half
ttle, and pouring off the
added three drops of pure
p.

hate of Sodium.—Dissolve
rallised sodium thiosulphate
e with distilled water.

c.c. of the kier liquor and
h, add 5 c.c. of the potassium
ops of dilute acetic acid 1 to 5,
ration of iodine, colouring the
d the decinormal thiosulphate
g. 2,740) until this yellow colour
then add a few drops of starch
use a deep purple blue tint to
the decinormal thiosulphate until
ely vanished. The c.c. employed
of chlorine. As an instance, some
taken from a kier which had been
ed goods—the goods had been in five
the last kier. The sample of the liqour
the "blue test," and when 100 c.c. of it
the decinormal thiosulphate as before
c. were required. Now each c.c. of deci-
hate is equivalent to 0·00355 gramme of
al, without sensible error, we may say that
es of kier liquor contained 0·0355 per cent

of the $\frac{N}{10}$ thiosulphate is equal to 3·55 milli-
chlorine, so that in the instance already cited,
e kier liquor would contain 355 milligrammes

or from another kier tested eleven by the "blue
was found to contain 0·034 per cent of chlorine,
lligrammes per litre.
k this test is much more simple than the "blue
ch more accurate, and enables the operator at any
certain exactly how much chlorine to add to the
rammes per litre may be read without error for
ical purposes as ounces per cubic foot. A cubic
ains six-and-a-quarter gallons.

IGNERS.—A correspondent calls our
umstance that Mr. W. S. Shirley,
ntly at East Ham, warmly advocated
annual tax on foreigners resident in
ituralised. Mr. Shirley's remarks
husiastically received by the work-

Correspondence.

ANSWERS TO CORRESPONDENTS.

Our Correspondence has now increased so largely that we cannot continue to reply to all through the post.

*** *We do not hold ourselves responsible for the views expressed by our correspondents.*

ALCOHOLIC POTASH.

To the Editor of the Chemical Trade Journal.

Sir,—If your correspondent Mr. Carter Bell will distil his alcohol after the addition of a little potash, he will find the difficulty he mentions overcome. I buy ordinary 60% O.P. spirits of wine, add some KHO and distil. The alcoholic potash made with this is only *tinged* yellow after keeping for weeks. I have adopted this procedure for years with perfect satisfaction.—I am, &c.,

E. W. T. JONES.

WATER GAS.

To the Editor of the Chemical Trade Journal.

Sir,—I quite endorse the remarks of your correspondent Mr. Maxwell Lyte upon the subject of the poisonous character of water gas when in its pure state; but has Mr. Maxwell Lyte made a trial of that used by Mr. A. Wilson, at his house at Stafford? If not, I would advise him to go and see it—aye, and smell it, too—for I can assure him it is not as odourless as he seems to imagine. It is, however, free from bisulphide of carbon, and does not give such a sulphurous atmosphere as ordinary coal gas. Perhaps Mr. Wilson will tell us how he communicates the odour to the water gas.—Yours, &c.,

M.

MULTIPLE EVAPORATION.

To the Editor of the Chemical Trade Journal.

Sir,—I should be glad if any of your readers would give me some information respecting Chapman's, and also Störmer's multiple evaporator. I do not require it for the purposes of a still, but for concentrating liquors from esparto boiling. I have heard that the former is in action at a paper mill in Lancashire, and the latter at a mill in Belgium, and should like some particulars concerning them. What I would particularly like to know is, what strength does the liquor leave the apparatus? and what amount of coal is used for the evaporation?—Yours, &c.,

A PAPER MAKER.

THE INSTITUTE OF CHEMISTRY.

To the Editor of the Chemical Trade Journal.

Sir,—The Institute of Chemistry having now completed the first decade of its existence, it is not unnatural that Fellows who, like myself, have hopefully subscribed their two guineas per annum from the commencement and received nothing in return, should ask themselves what good the Institute of Chemistry has done for them, what good it is likely to do, and what good it ought to do? It is, indeed, necessary that Fellows who have signed the declaration to "maintain the dignity and welfare of the Institute" should occasionally consider the Institute, its "dignity," its "welfare," its doings, and its value to them as Fellows.

From time to time during these ten years we have had statements put forward on behalf of the Institute by its officers, of which the following may serve as a fair sample:—

"The object for which the Institute of Chemistry has so strong a claim upon our interest is the maintenance and

Trade Notes.

A New Paper Company.—A company has been formed to purchase and work the paper mill at Chirnside, near Berwick. The proposed capital is £50,000, in 10,000 shares of £5 each.

Multiple Evaporation.—We hear that the Widnes Alkali Co. Limited are about to return to the system of causticising their alkaline lyes at a much lower strength than has been the custom during the past few years, and that, in order to save fuel, they are about to adopt the system of multiple evaporation. It is also announced that the Newcastle Chemical Works Co. Limited is about to do likewise.

Salaries in the Steel Trade.—In the recent trial *Siddell* v. *Vickers*, a foreman of the forging department stated that he had for some years been receiving over £2,000 a year as salary from his employers. We think this statement will have made the mouths water of many of our readers in the chemical trade. If a foreman of a department gets £2,000 per annum, how much does the manager receive? Steel is evidently a "good line."

The Dangers of Oil Lighting.—Recently a singular explosion occurred at the Bolton Iron and Steel Works. The establishment is lit by lamps, and oil was stored in an 800-gallon central tank in the engine-house. A gauge glass broke, and the engine-driver, named Atkins, approached with a lamp. Immediately the oil ignited and swept through the building, which caught fire. The flames were not extinguished till damage to the extent of several hundred pounds had been caused. Atkins was severely burned about the head and shoulders.

The Salonica Gasworks Limited.—This company has a capital of £80,000 in 16,000 ordinary shares of £5 each. It has been formed to acquire the concession granted by the Ottoman Government for the construction of gasworks in Salonica, Turkey. The concession gives the company the right to supply the whole town with gas. Salonica is described as the largest commercial and manufacturing town in the Ottoman empire after Constantinople, and the immediate future of the city is regarded as very promising. Should any new system of lighting be introduced the company is to have the first refusal.

Commercial Education.—Sir James Fergusson, M.P., recently distributed prizes to the successful students at the Mechanics' Institute at Burnley. There was, he said, something more required than the instruction given at present in our schools to furnish the means for those engaged in industrial employment to improve their position. Commercial and industrial education should be systematised, and that was now recognised as an incumbent duty upon the Legislature. Whereas foreign nations, and especially Germany, were doing so much to instruct their people thoroughly in technical, commercial, and industrial education, we had as yet done almost nothing, and had left private organisation and enterprising individuals to provide for that which the State had left undone. It was the misfortune, not the fault, of Her Majesty's Government that in the past session nothing was done for England; but, through the insistence of the members for Scotland, who were perfectly agreed upon the matter, a Technical Education Bill was passed for Scotland, whilst that for England was left to the next session. As chairman of the Factory Commission, he knew that in some parts of the country people shrank from compulsory education, and the Legislature had devised the expedient by which children should not be obliged to go to school, but that they should not be allowed to go to work unless they did. He was glad to think that that had already done a great deal. It was much better that the test educational standard should at first be too low rather than too high. Although glad to know that Scotland was still a little ahead of England regarding the test standard, he did not think England would be left behind Scotland.

Heavy Penalty for Butter Adulteration.—Ann Ironmonger, of Silver Hill Road, Derby, has been charged with selling adulterated butter. The prosecution was undertaken by Mr. Marris, the county inspector, who stated that it had come to his knowledge that people obtained butterine, made it up to appear like fresh butter, and then offered it as such in the market. He accordingly took steps to test the accuracy of this. On the 27th October his assistant visited defendant's stand, and obtained a sample of the "butter" she was offering for sale, paying for it at the rate of 1s. 4d. per pound. The sample was analysed, and found to contain 84 per cent of margarine.—Colonel Levett, the presiding magistrate, characterised the offence as an abominable fraud on the public, and defendant having stated that her husband purchased the article in Derby market, was ordered to pay a fine of £5 and £1. 15s. 6d. costs.

Found at Last.—The following passage from the address by Professor Stokes, as President of the Royal Society, at the anniversary meeting of the Fellows last week, is instructive:—"The Davy Medal for the year 1887 was awarded by the Council to Professors Mendelejeff and Lothar Meyer conjointly, for their discovery of the periodic relations of the atomic weights. This relation, now known as 'The Periodic Law,' has attracted great attention on the part of chemists, and has even enabled Professor Mendelejeff to predict the properties of elements at the time unknown but since discovered, such as gallium, for instance. But while recognising the merits of chemists of other nations, we are not to forget our own countrymen; and accordingly the Davy Medal for the present year has been awarded to Mr. John A. R. Newlands, for his discovery of the periodic law of the chemical elements. Though, in the somewhat less complete form in which the law was enunciated by him, it did not at the time attract the attention of chemists, still, in so far as the work of the foreign chemists above mentioned was anticipated, the priority belongs to Mr. Newlands."

THE LIVERPOOL MINERAL MARKET.

There is a considerable improvement in our market this week, and all round there is a better tone in prices. Manganese: Imports have been very trifling, and prices are much firmer. Magnesite (containing 98 per cent of carbonate of magnesia): There is more inquiry, but prices are unchanged at 30s. to 35s. for raw lump; raw ground, £6. 10s.; and calcined ground, £10 to £11. Bauxite in increased demand, and prices are firmer at 20s. for lump; seconds, 16s.; thirds, 12s.; ground, 35s. Dolomite, 7s. 6d. per ton at the mines. French Chalk: Arrivals continue small, but prices are easy at 80s. to 85s. for medium, and 90s. to 95s. for best. Barytes (carbonate): More offering, but prices are unaltered. Selected crystal lump scarce at £6; No. 1 lump, 90s.; best lump, 82s. 6d.; seconds, and good nuts, 75s.; smalls, 50s. to 60s.; best ground, £6. 5s.; and selected crystal ground, £8. 10s. Sulphate: Best lump, 35s. 6d.; good medium, 30s.; medium, 25s. 6d. to 27s. 6d.; common, 18s. 6d. to 20s.; ground, best white, 60s.; common, 45s.; grey, 32s. 6d. to 40s. Pumice-stone is steady; ground, £6. 10s. to £7; specially selected lump, finest quality, £9 to £10. 10s. Iron ore: There is an improvement, and prices are firmer. Bilbao and Santander, 7s. 6d.; Irish, 10s. Purple ore, 6s. Emerystone unchanged at £5. 5s. to £5. 15s. for lump; smalls, £5. Fluor and felspar unaltered. Fullers' earth steady; 45s. to 50s. for best blue and yellow; fine impalpable ground, £7. In Wolfram and tungstate of soda there is more doing, but prices are unaltered. Tungsten metal at 2s. 6d. per lb. Tungsten alloy, 2s. per lb. Chrome ore: There is still more inquiry, but no change to report in prices. Antimony ore, £8 to £10 for fair quality; £18. 10s. Antimony metal, £31 to £32. 10s. Uranium, 29s. to 32s. 6d. Asbestos: Best rock, £17 to £18; brown grades, £14 to £15. Potter's lead: Smalls, £10. 10s.; selected lump,

ined names now nearly forgotten, and it seems at a new edition, or new work entirely, on the s, but with a better system of compilation, and complete sub-division of labour, is desirable. labour should be spread over a larger number of and the system of issuing bulky volumes at 30s. t long intervals discarded in favour of the plan by Cassell's and other firms of issuing parts, say, at 1s. or 2s. 6d., or so, per part, which could ed to bind up in volumes at stated intervals. I hat if "Watts's Dictionary" had been issued in many a poor chemist would have been in posses- at invaluable work who, under the system adopted, without it.

armaceutical body, I believe, undertake the pub- of the *Pharmacopœia*. Why should not the of Chemistry undertake the work, or a share of lishing an "Official Dictionary of Chemistry?" ve details are not practicable others could surely and a work produced which would be one har- whole, and in accordance with the knowledge of ee from the faddy nomenclature of crotcheteers, credit upon its authors, and tending to unify al methods and teaching.

written these objections, criticisms, and sugges- a friendly spirit, and with a cordial desire to to the utmost of my power the dignity and welfare nstitute. The Institute exists to-day by the ons of its Fellows and Associates, metropolitan incial. The man who pays the piper has some hoose the tune.—I am, sir, MENENIUS.

GAS-TAR AND ITS USES.

XII.

EVER there is a gas-producer on the works wherein produced, it is a very easy operation to turn into n of tar, which instantly becomes converted into asses on with the main current. In this way a quantity of tar may be satisfactorily dealt with erted into a fuel gas, while there is no practical to encounter with regard to smoke or imperfect on of the tar, and owing to the larger quantity here is not so much difficulty in ensuring a regular nuous supply.

paper we have already quoted, and which was read arrison Aydon before the members of the Institu- Civil Engineers on February 26, 1878, the on of liquid fuel is treated of in five classes:—

Apparatus in which the liquid fuel is injected into ce as spray by the agency of compressed air.

. The liquid fuel, mixed with heated air, is made ite upwards through a porous bed. Mr. Aydon s class to include Sainte-Claire Deville's furnace, t is quite evident that Mr. George Anderson's nust belong to this class also.

The liquid fuel undergoes a preliminary process ation in a retort placed in the furnace, the gas rough numerous jets.

. The injection of the liquid fuel into the furnace strumentality of steam, preferably superheated, upply necessary for combustion being simul- drawn in as an induced current.

In this class, the liquid fuel was vapourised inde- in a separate still or retort, from whence the as conducted to the furnace, where it was burned

y these five classes may be made to include all of tar-firing, but it is quite evident to anyone who grain of practical experience, that the second, d fifth systems would never work successfully much less with tar, so that it is not worth while em even passing consideration.

In our opinion, neither St. Claire Deville's nor Mr. George Anderson's furnace belongs properly to the second class; they really form a division by themselves, and are perfectly satisfactory tar-burners, without any forced air supply or steam injection; but they are not so easy to work, and require more care than by the use of compressed air or steam.

But it now remains open to question whether the heating of retorts by the present means, almost universally adopted, is the best system; we think not. It would, we believe, be far better to turn the coke into a mixture of water-gas and generator-gas, and to heat the retorts by means of this mixture of gases rather than to heat the ovens with the coke fire direct. It is very well known that gaseous fuel can be applied much more economically than solid fuel; and, with such a generator, the utilisation of all the surplus tar of a works would be a very simple matter, as it would only be necessary to inject the tar with the air supply, when it would instantly become converted into carbonic acid and hydrogen.

For boiler firing, we believe that when tar is employed there is nothing so good as the steam jet, or compressed air system, the steam jet being the most simple and easily fixed; but in small works, where there is no steam boiler in existence, we hope shortly to be able to illustrate a new use for gas-tar, which promises to throw steam boilers out of use altogether.

The subject is one of very great importance to gas engineers. The gas-tar production of the country is gradually but surely increasing, and still nearly the whole of the coke of the United Kingdom is being made in bee-hive ovens. We believe that the time is very close at hand when bee-hive coke will cease to be made on account of the wasteful character of the process, and, if made in close ovens, such as those built on the Otto principle, ordinary gas-tar, with its accompanying benzol, naphtha, anthracene, and pitch, will be obtained. What will then be the condition of the gasworks with such a deluge of tar? The question they will have to face will not be one of an increase of a few per cents, but an increase trebling, or even quadrupling, the present supply.

We have it on very good authority that a foreign syndicate is about to invade England with a view to commence the recovery of the bye-products in earnest; therefore gas managers should keep themselves well posted up in methods for burning tar, so that when the time comes they may not have to learn.

SINGULAR GAS EXPLOSION.—Between twelve and one o'clock on Saturday, the 19th ult., an alarming explosion of gas took place in the large lamp which stood at the junction of Lichfield-street and Bridge-street, opposite the County Court, Walsall. It seems that on the previous night a jumping of the light in the lamp was observed, and in the morning Jabez Taylor, an experienced workman in the Corporation Gas Department, was sent to remedy the defect. Without turning out the gas—which is always burning in the lamp, being simply lowered during the day—he got into the vault below the platform upon which the lamp stood, and was engaged with a syphon, which is among the appliances, when he heard a rumbling noise in the lantern of the lamp. Realising that something was amiss, he sprang out of the vault, and had scarcely done so when a deafening explosion occurred, which alarmed the whole neighbourhood for some distance around, and threw down Taylor and the lamp. The massive iron lamp pillar was detached from the base, and broken asunder higher up, but Taylor escaped without serious hurt. Apparently gas had leaked from some part of the pipes, and accumulated around the light in the lantern until there was sufficient of it to explode, and then the effect of the explosion passed down the pillar and caused the damage.

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THE SALONICA GASWORKS LIMITED.—The [illegible] has a capital of £80,000 in 16,000 ordinary [illegible] each. It has been formed to acquire the [illegible] granted by the Ottoman Government for [illegible] of gasworks in Salonica, Turkey. The [illegible] the company the right to supply the whole [illegible] Salonica is described as the largest commercial [illegible] facturing town in the Ottoman empire [illegible] and the immediate future of the city [illegible] promising. Should any new system [illegible] duced the company is to have [illegible]

COMMERCIAL EDUCATION.—[illegible] recently distributed prizes to the [illegible] Mechanics' Institute at Bu[illegible] something more required [illegible] present in our schools to [illegible] engaged in industrial employ[illegible] Commercial and Indust[illegible] atised, and that was [illegible] upon the Legislature [illegible] especially Germany [illegible] people thoroughly [illegible] education, we [illegible] private organi[illegible] for that [illegible] misfortune [illegible]

HEAVY PENALTY FOR BUTT[illegible] Ironmonger, of Silver Hill Road [illegible] with selling adulterated but[illegible] undertaken by Mr. Marris, the [illegible] that it had come to his [illegible] butterine, made it up to [illegible] offered it as such in [illegible] steps to test the accu[illegible] his assistant visited [illegible] sample of the "butter[illegible] for it at the rate of [illegible] analysed, and fro[illegible] Colonel Lever [illegible] offence as [illegible] defendant [illegible] article in [illegible] and [illegible]

The prices in different

		£	s.	d.
	.. per ton	9	15	0
	.. „	14	10	0
	.. per oz.	0	2	6
	per ton	2	7	6
	per cwt.	1	17	6
	„	0	10	0
	.. per ton	2	19	0
	„	18	10	0
	.. per cwt.	2	5	6
	.. per ton	2	10	0
	per gallon	0	2	3
	„	0	4	0
[illegible], 60° O.P.	„	0	3	6
[illegible]	per cwt.	1	4	3
[illegible]	per ton	20	10	0
[illegible]	„	20	10	0
[illegible], Scotch, 885°—890°	„	6	10	0
[illegible], Russian	per gallon	0	0	3¾
American	„	0	0	6¼
[illegible]	per oz.	0	3	8½
[illegible]	„	0	2	9
[illegible] —				
[illegible]	per cwt.	0	8	9
[illegible] Sativa)	„	0	11	0
[illegible] metal)	per lb.	0	6	0
Carb. (refined Soda-ash) 48 %	per ton	4	15	0
(Caustic Soda-ash) 48 %	„	4	0	0
(Carb. Soda-ash) 48 %	„	4	0	0
(Soda Crystals)	„	2	12	6
(Crystal Carbonate)	„	5	0	0
Chlorate	per lb.	0	0	7½
Borate (Borax)	per cwt.	1	10	0
Bichromate	per lb.	0	0	3½
Hydrate (74 % Caustic Soda)	per ton	8	2	6
„ (70 % „)	„	7	2	6
„ (62 % „ white)	„	6	2	6
„ (60 % „ cream)	„	6	1	3
Bicarbonate	„	5	17	6
Hyposulphite	„	5	13	0
Nitrate (95 %) ex ship Liverpool	per cwt.	0	8	2½
Silicate (glass)	per ton	5	10	0
(liquid, 100° Tw.)	„	4	7	6
Sulphate (Salt-cake)	„	1	1	0
(Glauber's Salts)	„	1	17	6
Sulphite	„	5	12	6
Potassium (metal)	per oz.	0	3	10
Bichromate	per lb.	0	0	4½
Carbonate, 90 %	per cwt.	0	17	6
Chlorate	per lb.	0	0	6½
Hydrate (Caustic Potash)	per ton	22	0	0
Nitrate (refined)	per cwt.	1	2	0
Prussiate Yellow	per lb.	0	0	7½
Sulphate, 90 %	per ton	9	15	0
Muriate, 80 %	„	8	10	0
Seventism Hydrate, 98 %	„	7	0	0
Sugar, Beet	per cwt.	0	15	3
Cane	„	0	19	3
Sulphocyanide of Barium	per lb.	0	0	9½
Ammonium	„	0	0	6½
Sulphur (Flowers)	per ton	9	5	0
(Roll Brimstone)	„	5	15	0
Superphosphate of Lime (28 %)	„	2	5	0
Tallow	„	25	10	0
Tin (metal)	„	165	0	0
Crystals	per lb.	0	2	3½
Zinc (Spelter)	per ton	19	0	0
Chloride (solution 98° Tw.)	„	5	15	0

Chemical Trade Journal,
TURDAY, DECEMBER 24, 1887.

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TO ADVERTISERS.

IAL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

first week of the approaching New Year we shall SPECIAL NUMBER of the Journal. We to bring our first volume to a close with the last in December, 1887. The issue of January 7th, . 33), will commence Volume II. It will be an special number of very general interest. We shall ng with it a Title-page and Index for the first together with a neat and useful Office Almanac, for our subscribers, which is now in course of ion.

ling our regular subscribers, our New Year's will be issued to NOT LESS THAN 10,000 AND INDIVIDUALS, so that intending rs will see at once that this issue is worthy of cial attention.

ay explain that, in our Publishing Department, we very carefully-compiled lists—in most cases the special knowledge and information at our com- f every firm of repute, both at home and in the ding centres abroad, connected with the various s whose interests it is our province to serve. We ese lists week by week, by selecting a number of turn, and sending out free copies of the Journal to ms who have not yet become annual subscribers. lt is that almost every day brings us a fresh batch ribers. We shall continue this process until we what we consider our normal circulation, and have fixed at a tolerably high figure. On the of New Year's Special Number we shall MAKE F THE WHOLE OF THE LISTS WE REFERRED TO, numbering altogether, as stated, not less than 10,000 names. rse, for this special issue there will be special advertisements; but those order a series, mencing with that number previously, will vantage at our regular terms es of bringing der the notice of large circle of

Legal.

DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ & CO. *v.* PETER SPENCE & CO.

Expert Evidence (continued).

Dr. Ferdinand Hurter, Vice-President of the Society of Chemical Industry, and consulting chemist to the firm of Gaskell, Deacon, and Co., examined by Mr. Aston, gave evidence as follows:—

You have had a long experience as a chemist, practical and scientific?—Practically 23 years.

I believe that you, in conjunction with Dr. Lunge, produced a well-known practical book which is a theoretical and practical treatise connected with the manufacture of alkali, and which is a standard work?—No, you are referring to the wrong work; that is Professor Lunge's only. We have together produced a book for the use of alkali manufacturers.

That is "The Alkali Maker's Pocket Book"?—Yes.

In this are given all the directions commonly used by practical alkali makers?—Yes.

Have you, in the course of your experience, come across the product known as Weldon mud?—I have. I came across it almost as soon as it was produced by Mr. Weldon.

How long ago is that?—I first heard of Weldon mud in 1867.

That is twenty years ago, at all events?—Yes.

Is it a common product among alkali manufacturers?—It is a very common product.

And bleaching powder makers generally use it now the patent has expired?—Yes, and we have letters from various other manufacturers who require peroxide of manganese from various oxidations, to supply them with a peroxide of manganese. Colour manufacturers, for instance.

Do you say you supply it from your works?—Yes.

As an article of sale?—Yes.

How long ago is that?—That I could not recollect. It is a long time since. As soon as Mr. Weldon had produced the peroxide of manganese, from various purposes it came into request.

Mr. Justice Kekewich: Would it be ten years ago?—Yes.

Mr. Aston: What is the active agent in Weldon mud?—The active agent in Weldon mud is peroxide of manganese.

What other substances go to form Weldon mud as it is produced by the Weldon process?—Weldon mud consists in reality of the liquid itself, the solution of chloride of calcium in which is suspended the peroxide of manganese, and sometimes also some minor impurities.

Have you read the specification of Messrs. Spence?—I have.

In your opinion would that enable the object of Messrs. Spence to be attained, so far as regards the removal of iron from sulphate of alumina in solution?—Would it what? I do not quite understand your question.

Would the specification enable a person who followed its directions to remove iron from sulphate of alumina in solution?—Yes, it would.

What agent would he employ, following those directions, as an addition to the sulphate of alumina in solution?—He would use peroxide of manganese.

Supposing the directions are followed which are contained there—if you will kindly turn to the specification—"We add to the above-named solution peroxide of manganese in the proportion of six parts by weight of dry peroxide of manganese to every one hundred parts by weight of dry sulphate of alumina cake contained in such solution; such peroxide of manganese we form artificially in a mode similar to the production of Weldon mud in the chloride of lime manufacture." Would any person, in 1882, have known how to produce, artificially, the peroxide of manganese?—Certainly.

It goes on to say—"and it should be fully oxidised by modes well known." You have told us that Weldon mud would contain peroxide of manganese, protoxide of manganese, and other matters?—Yes.

In 1882 were there known modes of completely oxidising the protoxide?—Yes.

Were they means ordinarily used in the bleaching powder process by people who wanted to get complete oxidation?—For the bleaching powder process manganese is not required in the highest state of oxidation. It is preferable to have it if you can get it, but it is not absolutely necessary, therefore we do not need such a thing.

But if people desired to convert a protoxide into a peroxide, was it well known how to do it?—Certainly.

Will you be kind enough to tell us how it would be done?—What would occur to one as the first mode would be to add a powerful oxidising agent, such as bleaching powder.

That is hypochlorite of lime?—Yes.

Anything else?—Another mode of proceeding which might not result in the very highest state of oxidisation, but which would reach probably to from 97 to 98 per cent, would be to use a comparatively large excess of lime in the first operation of producing Weldon mud, and blow air through sufficiently long.

You say those were processes well known?—Quite well known.

You have heard the evidence given by the last witness, Mr. Davis?—Yes.

Assuming that the experiments which he made were conducted in the way that he told us, have you any doubts as to the results which would follow speaking as a chemist?—Will you kindly repeat the question?

Do you remember the experiments to which Mr. Davis referred when he spoke of having used various forms of Weldon mud and matters derived from it?—Yes.

He applied them to capture and remove the iron. You heard the details of his experiments?—Yes.

Have you any doubt, as a chemist, that the course pursued by Mr. Davis would lead to the results which he indicated?—I have no doubt whatever in some instances, because I repeated some of the experiments myself. I have no doubt that peroxide of manganese, in the shape of Weldon mud, will remove iron from solutions. I can also say that Mr. Davis is sufficiently able to make such experiments and form correct conclusions; but more than that I could not say.

When you have used Weldon mud to remove iron, was it Weldon mud containing peroxide and protoxide and the other matters you have spoken of?—I used it in both forms containing the peroxide and the protoxide and the lime, and also in the other forms, by simply purifying it partially by digesting it with acid.

And you found you could remove iron?—Yes.

Are you able to tell my Lord what was the active agent that removed the iron?—The active agent was simply peroxide of manganese in the Weldon mud.

We have heard something about manganites that are contained in the Weldon mud. As an experienced chemist, what do you say about the existence of manganites in Weldon mud?—The term "manganite" is simply a convenient form or a convenient method of explaining certain phenomena referring to the Weldon process, but it is utterly unknown whether such a thing as a mangani e, a defi[illegible] chemical compound, really exists.

[illegible]anite would be a combination of manganous [illegible]ething else?—A combination of manganous [illegible] base.

[illegible]you know, has it been ascertained as a [illegible]anganous acid does combine with a [illegible] form in the Weldon mud?—To the [illegible] manganese shares the property of [illegible]in solutions salts and other things [illegible]. To that extent the manganite

You have told us that, in your opinion, the peroxide is the active agent in the production of this product. I will ask you this first. Can the peroxide be produced from the lower oxides by modes known in 1882?—Certainly.

Can peroxide be produced from the higher oxides of manganese known in 1882?—Yes

By known processes?—Yes—that is to say, I should think that no chemist would have any difficulty in doing it.

Just tell me the forms of the higher compounds of manganese where any manganic acid or permanganic acid are found?—There are very few salts in which they occur—chiefly manganates and permanganates of soda and potash.

But those two bases as combined with manganic acids are well known, are they?—Yes, very well known.

Operating upon those compounds wherein manganic and permanganic acid is known to exist, would there be any difficulty in producing from them forms of peroxides?—None whatever.

If produced from them would it answer the purposes of Messrs. Spence's patentees?—I should expect that it would just as well as the Weldon mud. In my opinion there is no difference whatever between peroxides thus produced and that produced by the Weldon process.

If you get a peroxide, in your opinion it does not signify that it is produced from the higher or the lower oxides?—No.

And you say that as a chemist?—Yes.

You have not tried the experiment, I believe?—I have not.

You have told us that peroxide in the form of Weldon mud exists in the form of hydrated peroxide?—Yes.

And supposing it is combined with lime would it still?—As far as my own analyses of the compounds contained in Weldon mud go they show that these compounds are very highly hydrated compounds. If I were to consider it as a manganate of calcium I should have to add that it is a manganate of calcium combined with a large amount of water.

Is there any difference between manganite of hydrogen and hydrated peroxide of manganese?—None whatever, they are two names for the same substance.

You can give me the elements, can you not, in both of them?—I have to assume a hypothetical composition, of course, for manganite of hydrogen. I can give you the elements in both of them.

Would you be so good as to do so?—I should say the formula for the manganite of hydrogen would be $H_2 Mn O_3$.

And what would be the formula for the hydrated peroxide?

Mr. Moulton: I do not contest this.

Mr. Aston: Very well. Now, Dr. Hurter, you have read the specification of Mr. Kynaston?—I have.

You have a copy of it there?—Yes.

Comparing his object with the object of Messrs. Spence what would you say?—I say that the object was precisely the same.

Comparing the means employed by Mr. Kynaston as he described in his specification, page 2, line 20 down to 26—comparing that with the process described in Spence's specification, what do you say?—I say it is precisely the same agent that is used.

Is it used in the same way?—Yes, as far as I can see from the specification.

In point of fact does Kynaston propose to use manganese combined with oxygen in the form of a peroxide?—Yes.

And does he propose to use it in the form of a peroxide obtained from a low oxide by oxidisation?—Yes.

You heard the evidence of Mr. Davis that he left in the solution 7 per cent of the iron which existed when he first began. Did you hear that statement?—I did.

Speaking as a practical chemist, do you consider that a large proportion of iron to be left?—No, I think it is a small proportion of iron to be left.

Would it be fair to say a minute proportion?—It depends

what the proportion was to begin with. I do not recollect what that was.

You have not made experiments on that yourself?—No.

Cross-examined by Mr. Moulton.

You told us that manganese combines with oxygen in various proportions; that is so, is it not?—It is.

And that which is commonly known as the di-oxide or peroxide is, what?—what is its chemical formula?—$Mn\ O_2$.

$Mn\ O_2$ is a substance comparatively common in nature, is it not?—Yes.

I may say it is a large article of commerce, and is probably as well known as any substance in the laboratory?—Yes, I should say so.

It is perpetually used, is it not, for the production of chlorine and the production of oxygen?—Certainly.

The form in which peroxide is an article of commerce is what is called black oxide of manganese, is it not?—Yes.

I do not say that it is absolutely pure, but substantially that is the peroxide, is it not?—There are some in which substantially there is hardly anything else but peroxide. There are others in which there are more or less impurities.

I will take a case which is, as you say, substantially pure—peroxide of manganese. Will that throw down the iron in an aluminous solution?—I cannot tell from my own knowledge.

Have you tried it?—No.

You are not prepared to say at all, are you?—No.

Now, just answer me one question. Is it not a fact that anhydrous peroxide of manganese—that is, the $Mn\ O_2$ of which you have spoken—will not throw down the iron from an aluminous solution, but that you are obliged to use the compound of that with $H_2\ O$?—I do not know.

You have been asked questions as to whether peroxide of manganese would do these various things. Then, for your last answer, I take it that you are not prepared to say——?—The anhydrous peroxide of commerce, I am not prepared to say.

And not only the anhydrous peroxide of commerce, but put it to you that if you make chemically pure the anhydrous peroxide, you are not prepared to say it will do it?—Because I have not tried it.

That is an experiment that would not take long, would it?—It would take more time than I had at my disposal, or I would have tried it. Excuse me, but I will say this, if I were to accept from some other chemist a sample of peroxide of manganese on trust that it was a peroxide of manganese anhydrous, it would not take many minutes to make experiment; but if I am to satisfy myself that it is a peroxide of manganese anhydrous, it would take research.

I am delighted to find that you do your work so carefully; that is exactly what I wanted to know. Now, just tell me this: with a specimen of di-oxide, how would you make sure that it was anhydrous?—I should have to make a complete analysis.

Can you tell me how?—Yes. I should in the first place determine the peroxide of manganese which the sample contained; and I would then determine the other impurities which it contained. Do you wish me to give it in detail?

No?—I should then by adding up the various constituents of that sample of manganese get to know that there can be only traces of water in that sample. If I were asked to determine that there is water in that sample I should have to drive that water out by means of a red heat and collect it in a substance which has a great affinity for water, and by the increase of weight in that I should determine the amount of moisture.

That would be taking abundant precautions to be sure that it was thoroughly anhydrous, and I am very sorry indeed that you have not tried the experiment. I mean to say I am sorry if I cannot get an experiment which would substantially settle this point so far as your opinion is concerned between now and to-morrow morning. If the anhydrous is effective—do you follow me?—Yes.

If the anhydrous is effective in throwing down iron then it follows, does it not, that the anhydrous of commerce, which is mainly anhydrous di-oxide, will be effective?—It does not follow.

Why not?—Because it is perfectly evident from the specifications that in some way or other the peroxide of manganese combines with iron. The product of commerce already contains iron, and I could not as a man of science suppose that the same peroxide of manganese that I had used once for throwing down iron would be useful again for throwing another lot of iron down; nor would I expect that an ore of manganese containing a large amount of iron would be of any use whatever for removing iron from other things.

I understand that. I want you to understand the object of my question. I do not want in any way to catch you, as a matter of fact that I intend to prove independently, that $Mn\ O_2$ (peroxide of manganese in its anhydrous state) will not precipitate iron from these aluminous solutions. You have told us that you are not prepared to say at all, but you have not tried it. I only want to see if I can get an experiment which could be done by you before this case is over, say by to-morrow morning, which will test it. First of all, you have said you would not like to take the peroxide of manganese of commerce, because it might contain iron. Is it not the fact that it really contains, if any, only infinitesimal portions?—There are plenty containing any amount of iron.

Pyrolusite I am talking about?—Yes, pyrolusite, but pyrolusite is not one that can be very often obtained; we have to pay a very high price for pyrolusite.

Pyrolusite is $Mn\ O_2$ is it not?—Yes.

That is almost pure?—Yes.

Then taking that as a sample substantially pure, could not you try whether that would throw down the iron?—There is no difficulty in trying that.

One that would not take you long?—I should have to take it on trust that you give me pyrolusite.

Supposing you got pyrolusite—I want to have you as a witness for me, you will understand—and tried the experiment, as I am sure you would try the experiment, fairly; do not you think you could try that? Take pyrolusite, which is, as you say, almost pure, and try whether that throw iron in an aluminous solution. Could you do that by to-morrow?—Not satisfactorily.

At all events you could try, so as to tell us the result?—I would not stake my reputation on an experiment between now and to-morrow morning.

I do not want you to stake your reputation, but you could try the experiment, could not you?—Yes.

Will you do that?—Where shall I find the means of doing it?

Pyrolusite can be obtained. Do you object to do t?—Yes. Unless I can make the experiment complete, so as to let it be a satisfactory research, I object to do it.

Mr. Aston: We shall call witnesses who have made the experiment, Dr. Hurter has not.

Mr. Moulton: Now let me take another point. There are oxides of manganese which are lower oxides than $Mn\ O_2$ are there not?—Yes.

For instance, there is the protoxide and there are intermediate oxides?—Yes.

There are means by which these can be oxidised up to the peroxide?—Yes.

Let me take the well-known oxidising means of pouring concentrated nitric acid upon it and heating it. That will oxidise a protoxide into a peroxide?—That is to say, you would obtain in the first instance nitrate of manganese, and by igniting it at a very high temperature you would produce a di-oxide.

That would be by oxidising the lower oxide?—That would, in my opinion, be by the decomposition of the nitrate.

You would start with a lower oxide and you would oxidise it into a higher one, would you not?—The final result would be that I had obtained my bi-oxide from the protoxide.

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[illegible] but the clai
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[illegible]—No.
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[illegible]
[illegible] a distinction between mangani
[illegible] I am not talking about the salts

manganic acids; I am talking about manganic acid itself. Is the direction to get this from manganic acid?

Mr. Aston: There is no direction.

Mr. Moulton: Then I will alter the form of my question. Could any person taking this specification in his hands obtain peroxide of manganese from manganic acid—not from the salts of manganic acid, but from manganic acid?—No.

Now I will put the permanganic acid. Have you ever seen permanganic acid?—No.

Do you believe anybody else has?—Not in the pure condition.

Taking the specification in his hands, could any person obtain peroxide of manganese from permanganic acid—not its salts, but permanganic acid?—Yes.

He could?—Yes.

Let us have no mistake. I am talking about permanganic acid as contrasted with its salts; do you think he could?—Yes.

Let us have no mistake. I am talking about permanganic acid as comprised in these salts?—Yes.

You say a solution of permanganate of soda is by the chemist assumed to contain permanganic acid?—Assumed to contain permanganic acid; yes, sir,

A solution of permanganate of soda is?—Yes.

Now, are there any directions in the specification for obtaining peroxide of manganese from even a solution of permanganic acid?—None whatever.

Well, now, there was no commercially known process of dealing with a solution of permanganic acid in 1882, was there?—What is commercially known?

Well, generally known. I will take it known to manufacturers in this trade first?—Yes.

There was a mode of dealing with permanganic acid?—I do not think any English manufacturer would have had the slightest difficulty in producing $Mn\ O_2$ from a solution of permanganic acid.

Was there any process that had ever been commercially applied?—I have never known one applied, certainly.

Now, in one way do you say that an English manufacturer could have dealt with a solution of permanganic acid for the purpose of obtaining peroxide of manganese from it?—If I had been asked to do it I would have simply mixed it.

I am not talking of you, Dr. Hurter, I am dealing now with what I might call trade knowledge—I will come to the knowledge of very skilled chemists presently—I want to get at the trade knowledge first. Now, take an English manufacturer in such trades as these. How do you suggest that he would have proceeded to get manganese peroxide from a solution of permanganic acid?—He would mix it with a solution of manganese chloride.

Well, would that have obtained it?—That would have obtained it, yes.

What would it have obtained?—It would have precipitated peroxide of manganese.

Would that have been $Mn\ O_2$, or manganite of hydrogen?—It would have been manganite of hydrogen.

By-the-bye, manganite of hydrogen, or as you have called it hydrated peroxide of manganese, can be reduced to $Mn\ O_2$ by heating to say about 300 deg., cannot it?—Yes, I should say so.

Then if it is manganite of hydrogen it will become $Mn\ O_2$?—I am not sure of that.

You have not tried it, have you?—No, but I am afraid some of the oxygen would go off as well, but I am not sure.

I presume you will not say that that was in any way a commercially known or trade operation at that time?—I do not think it has been wanted for any purpose whatever of our trade. I will speak for our trade.

In your opinion is there any commercial utility in obtaining peroxide of manganese from a solution of permanganic acid?—It is by no means certain that in certain places, if I wanted a hydrated peroxide of manganese, it would not be a very cheap way of producing it, almost as cheap as any other.

The cheap way, the one you refer to, is using this chloride of manganese?—Yes.

There would be other ways, I need not ask, many other ways?—Yes.

Now, of those ways some might end in manganite of hydrogen and some might end in $Mn\ O_2$, might they not?—Yes.

You could make the result either of those, could not you?—Not easily. I could make them either of those, but the hydrated peroxide would be in most cases the first product.

Easily converted?—It would be the first product obtained, and you would have to convert it to anhydrous peroxide before you reached that step.

I will now put it in another way. You might from a solution of permanganic acid either obtain manganite of hydrogen, or you might obtain the anhydrous peroxide?—Yes.

Now we come to the salts of manganic and permanganic acid, and I presume, with regard to the solution which you have spoken of as permanganic acid, you obtained that, did you not, from the salt of the permanganic acid which you treat?—Yes.

Therefore you know no way of obtaining peroxide of manganese from permanganic acid, as distinguished from getting it from the salt of permanganic acid?—No.

Now, we have heard of the salts of manganates, and we have heard of the salts of permanganates. Now take the case of obtaining the peroxide of manganese from the lower oxides. I may take it that you have never tried any experiments in that. You have told us of the only two experiments you tried?—I have only satisfied myself that di-oxide of manganese in that form will carry down iron, that is all.

And only in that form?—Yes.

Now, you have called attention to these last three lines—"We would have it understood that we do not confine ourselves to the above specified quantities, nor to the precise mode specified for the application of our invention, nor do we confine ourselves to the use of the aforesaid 'Weldon mud.'" Now, speaking as a chemist, do you understand that to amplify the means of getting peroxide of manganese so as to practically include all peroxide of manganese?—That is how I should understand it.

One question more: If manganese is combined with oxygen as a peroxide is the definite chemical formula $Mn\ O_2$ for that?—It is.

Now I want to ask you a theoretical question or two, Dr. Hurter, and the question I want to ask you is this, we have had here the word "hydrated" used. Now, I will take something apart from this case. I will go away from the things that we are actually dealing with here, and I will take, for instance, the oxide of alumina.

Mr. Aston: May I ask whether it is material to go into these other combinations, which are not involved in this case?

Mr. Moulton: What is the chemical formula for that oxide of alumina?—The chemical formula is $Al_2\ O_3$.

Now, there is what you call a hydrate of that, is there not?—There is.

Now, that has a definite chemical formula?—It has.

What is that?—$Al_2\ O_3\ 3H_2\ O$.

That is a compound—a definite chemical compound with grain items or components, which are hydrogen alumina and oxygen?—That is so.

Now, you may put into the same bottle with oxide of alumina the same quantity of water as is shown here, combined, and they won't mix, will they?—In a way they would, as a mechanical mixture.

They will mix but they simply form a paste?—They would not combine, if that is what you mean.

Mr. Aston: Not chemically?—Not chemically.

Mr. Moulton: Now, when they do chemically combine

roxide, and would throw down iron?—

lution before adding the manganese
ral as possible, otherwise some man-
nto solution." That is a matter you
No.

ed iron and manganese material, after
m the solution, is treated with an acid
ic, and the iron extracted when the
ready for use afresh." That gives a
how you would revivify, as it were, the
this process. Is it not so?—That I
e not tried it by that process.

other question, and I think this is the
put to you, that is this. Weldon mud
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making bleaching powder, and for the
place of the natural peroxide of man-
?—That is so.

at there is nothing in the fact to show
not combined with a base in Weldon
thing whatever.

that is concerned, it may be that the
form of manganite of calcium, to some
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nese substituted for the lime. May it
may be so.

examined by Mr. Aston.

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found that it does.

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vater or a base, and you said there was
n that it should be so?—I did.

llowed the direction given by Messrs.
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form artificially," and so forth, would
not in that case form the hydrated
the purpose of capturing the iron?—
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plication of our invention, nor do we
o the use of the aforesaid 'Weldon
there, the form of peroxide that is
used in the form in which it exists in
ever that may be?—Yes.

a chemist of any reason why the per-
, however it be formed—whether it be
eldon mud by converting the protoxide
or formed from the oxides in the way
ibed—do you know any reason why the
nese, however formed, should not be
rpose of capturing the iron?—I do not.

lief upon it as a chemist?—My own
se peroxides formed in that way would
s.

rence in the chemical constitution of
ou obtain it by adding O to Mn O, or
n O_2? Is there any difference between
d Mn O?—No difference as far as the
is concerned.

rence, as far as you know, in the effect of the Mn O when one part of the oxygen is added to it, and Mn and O_2 when one part of oxygen is taken from it; I mean as far as its chemical action goes?—As far as I know there is not.

Then assuming that the claiming clause is a claim to the use of peroxide of manganese, whether formed from the lower oxide or from the higher oxide—assuming that—in your opinion would any person have any difficulty in forming the peroxide from the lower oxide, having regard to the state of public knowledge in 1882?—None whatever.

Would he have any difficulty in forming the peroxide for the higher oxides by taking away oxygen in 1882?—No.

You gave an answer with regard to the permanganic acid. Assuming that it is in a state of solution, and that it is not isolated, you said that could be converted into protoxide in the way you told my Lord?—Yes.

Would there be any difficulty in operating in a similar way upon manganic acid, that is Mn O_3?—The answer I gave was that permanganic acid is really started from a permanganate of either soda or potash. I added a stronger acid by eliminating the permanganic acid, and took hold of the base that was formerly combined with the permanganic acid. Such an analogous process as that if applied to the manganates would result in the production of permanganic acid, not manganic acid. Therefore I could not answer you that I would produce directly from manganic acid a di-oxide, owing to the peculiar property of manganic acid, which instantly decomposes as the result.

Supposing you were to take manganate of soda, in manganate of soda you have manganic acid; could you from manganate of soda produce peroxide of manganese?—Readily.

With great ease?—Yes.

And that would be by separating the manganic acid from the soda and causing it or a portion of it to go to the oxide which formed the peroxide of manganese?—It would not be absolutely necessary to do that.

How could you, then, bring it about?—If I simply dissolved the manganate and added chloride of manganese to it I should immediately obtain di-oxide or hydrated di-oxide of manganese, or, if I simply acidified the manganate, during the process of acidifying I should also obtain di-oxide of manganese.

And that you say was very well known?—Very well known.

There are many discoveries in chemistry that go beyond the prophecies of to-day, or that may go beyond the prophecies of to-day. Supposing that at some future period anybody could discover as isolated bodies the manganic acid and the permanganic acid there would be no difficulty, would there——

Mr. Moulton: How could such a question be asked?

Mr. Aston: I am putting my friend's own hypothesis.

Mr. Justice Kekewich: When Dr. Hurter or somebody else has succeeded in discovering that which has not yet been discovered, he is asked to say what will be done with that thing the properties of which are not at present known.

Mr. Aston: There is nothing more common in chemistry than to say "I claim this agent as made to-day, but if another way of making this agent is discovered to-morrow, it will still be the use of my invention."

Mr. Justice Kekewich: That is quite a different thing.

Mr. Aston: If your Lordship thinks I ought not to put the question I will not do so.

In your works is it an ordinary practice to deal occasionally with peroxide of manganese?—Yes, it is every day's practice.

What chemical notation do you employ to designate the peroxide of manganese that you use?—Mn O_2.

What is the real character of the manganese that you deal with?—It is Weldon mud.

The hydrated form?—Yes. I have here, if it will interest you, a page of our book.

Will you tell me as a matter of fact?—We call it Mn O_2.

Although it is hydrated you call it $Mn\ O_2$?—We take no notice of the hydration; we simply call it peroxide of manganese.

You heard Mr. Davis say that he took the peroxide of manganese as it exists in Weldon mud, removed the additional matters, took the peroxide and heated it to. I think I said, 500 deg. or thereabouts. Would that produce anhydrous peroxide of manganese?—As I have said before, I think it would produce an impure anhydrous.

Then if that would answer for the purpose of capturing and removing the iron have you any doubt but that that anhydrous peroxide would answer?—I think that if one anhydrous peroxide is proved to do it all the others would do it too.

Would you kindly repeat what your own experiment was with reference to the Weldon mud, or $Mn\ O_2$ as you call it, which was left when the impurities had been removed? Just tell me what was your own experiment?—My own experiment consisted of dividing a certain portion of Weldon mud into two exact parts, to take away from the one half as far as I could, by boiling it with nitric acid, the peroxide of manganese and the lime, washing it, and using it in that washed condition for precipitating iron for a solution containing iron.

What was it exactly that remained, that you used for precipitating the iron?—Hydrated peroxide of manganese.

As far as you know, was there any lime remaining?—As far as I think there was none. I did not try it.

Would the nitric acid have a strong affinity for the lime?—It would. As a chemist I have every reason to suppose that the lime was removed.

What conclusion, then, do you draw from the experiment as regards any usefulness of the lime?—The conclusion I draw from my experiment is that the agent which acts on the peroxide of iron is the hydrated peroxide of manganese as they call it simply.

Mr. Moulton: There is one question which I ought to have put, but which I forgot, and, with your Lordship's permission, I will put it to him now.

I put it to you, with regard to the half of the methods spoken of in the claim. I ought to have put it with regard to the other half. You told us that this process of de-oxidisation might be made to lead either to the hydrated or anhydrous form of di-oxide of manganese. You would say the same thing with regard to the oxidising process, would you not?—Might I ask you to repeat that question?

You told us that the result of the deoxidising process referred to in the claim in Spence's patent might be made to be anhydrous di-oxide or hydrated di-oxide at will?—Yes, I could produce whichever I pleased.

And you would say exactly the same thing with regard to the oxidising process, would you not?—Yes.

Mr. Justice Kekewich: Mr. Aston, I hope it will be possible to avoid going into this ground with every case, or at least I may venture to express a hope it is possible to avoid going over a good deal of the same ground with some of the witnesses.

Mr. Aston: I think so. I will endeavour to avoid going over the same ground in every case.

Mr. Justice Kekewich: You see, it not only takes time for your examination, but it disturbs my mind, because, of course, I am always thinking it is a new question until I am satisfied it is an old one, and then I have to refer. Then Mr. Moulton cannot refrain from pursuing in cross-examir [illegible] line which you put to the witnesses in examin [illegible] ef.

[illegible] our Lordship's permission I will put [illegible] whom I still have to call, this. [illegible] their experiments both upon [illegible] forms of peroxide. With [illegible] I will, with your Lordship's [illegible] they agree with the two [illegible] way.

[illegible] Mr. Moulton can go as far as he thinks necessary in cross-examination; that is, he can cover as much as he thinks convenient by a general question; go into detail as far as he thinks necessary for his case, and he must have a large discretion. Then, if he goes into new matter, you must deal with that in re-examination.

Mr. Aston: I will, my Lord.

Mr. Moulton: So long as my friend puts to these witnesses the experiments they have made, I think that arrangement will answer.

Mr. Justice Kekewich: You, of course, may have questions to ask to bring out your case, which are different from what Mr. Aston would ask in examination-in-chief, but with regard to repeating it in detail it does not really add to the weight of the evidence.

Mr. Aston: I do not think it does really.

Mr. Justice Kekewich: Repeating in general terms may add to the weight, because there you have the concurrence of testimony of skilled persons, but repeating in detail does not, provided you have gentlemen rather more educated—skilled witnesses—listening, and I have no doubt taking in all that is said. I make these remarks now in the presence of the witnesses, so that they may know what they are going to be asked, and they will be able to say how far they agree with Dr. Hurter.

David Basil Hewitt, M.D, was next examined by Mr. Aston.

GAS-TAR AND ITS USES.

XIII.

We have now very nearly exhausted all that it is necessary to say with regard to tar burning. By means of one or other of the various devices we have either described or illustrated, tar may be burned with ease, and with satisfaction to the users of it, provided all our instructions have been duly carried out. In this connection we have received from several correspondents notices from the newspapers setting forth that the filtration of tar, we have so strongly advised, has been described by several (notably, one) gas experts as being "ingenious nonsense."

Singularly enough by the same post came a tracing of a new tar filter from a gas engineer of very varied and extensive experience, and a letter saying that he had never met with any difficulty since commencing to filter his tar. This in itself is almost a sufficient answer to those who travel from Dan to Beersheba and find it all barren, save where they have planted; but we may say that these chapters were not written for the benefit of those gas engineers who can make thousands of tons of tar per annum without having a piece of dirt in it large enough to choke up the one-sixteenth of an inch orifice of an ordinary tar burner. Such men are quite able to take care of themselves, and we may say again we have not attempted to teach them, still we maintain our point that tar filtered is better and more fit for burning than tar unfiltered; we should have thought that this would have gone without the saying.

Having exhausted the question of the use of tar as a fuel, we may now turn our attention to some of the other purposes to which it has been put without distillation.

For many years coal-tar was very extensively employed for the preservation of building materials of all kinds. It has always been surprising to us that more use has not been made of gas-tar for producing damp-proof bricks for the ground line or basement courses of ordinary buildings. In order to do this properly, an old boiler should be half filled with gas-tar, and the contents heated by means of a steam coil. The bricks should be taken hot from the kiln and thrown into the heated tar, whereby they become strongly impregnated with tar, and are rendered very hard and waterproof.

Of course, special care must be taken to prevent fire or flame coming in contact with the heated tar. After the bricks have been immersed for about half-an-hour in the heated tar they may be removed and placed to drain and

is treatment not only renders the bricks damp t renders them more durable, and enables them to greater crushing weight. For the purposes of works, stones, earthenware, pipes, &c., are nearly oiled in tar before use, as such treatment enables stand the action of the corrosive vapours and uch better.

ıge's "Coal Tar and Ammonia," it is stated that brickworks has extensively employed coal-tar aring black roofing tiles with perfect success. ıge says, however, that a mere dipping in coal-tar is not sufficient; the tar should ed to at least 100° C., and the bricks or uld be left in for some time isolated from one on convenient frames. In practice it is very well hat tar which has been deprived of its water and s more volatile oils by partial distillation would nore satisfactorily than raw tar, and this may also of tar used in the processes of asphalting, an n we shall fully describe in a future chapter. ır distillers make what is called "prepared tar," answers extremely well for all purposes of proce- h as we have hereinbefore described. Indeed it is ıatter for consideration whether in many works it ot pay better to extract the naphtha and light oil tar for sale, and to burn the mixture which is now er the name of "prepared tar." Pitch is just now rug that all tar distillers would heartily welcome cess for limiting the production, and this would ıuredly help to get rid of some of it.

ar varnishes are also very largely used in painting ; they are made of various quality, generally by the length of time taken to dry, the finest drying in half-an-hour, and the cheapest in four hours. As there is much art in making these s properly, we shall devote a special chapter to paration in some future number of the *Journal*.

OUR BOOKSHELF.

n Indian Fibres and Fibrous Substances. By C. F. Cross, E. J. Bevan, and C. M. King.

work, which is published by authority of the Secre- State for India, contains the results of the chemical roscopical examination of a number of the more nt fibrous materials exhibited at the Colonial and Exhibition of 1886. It also includes an appendix George Watt, C.I.E., M.B.C.M., scientific adviser Indian Government, on the native methods of and using various fibres.

d its origin at one of the meetings held in the ıce-room of the exhibition, which were instituted view of bringing together gentlemen who were y interested in the subject for discussion.

ıis meeting (a conference on "Fibrous Materials for Paper-making") Mr. Edmund Joynson, the own paper-maker of St. Mary Cray, offered to e himself with the authors, and to undertake a c and practical examination of the whole series of hibited in the Indian Court.

I. consists of a minute description of the chemical roscopical methods of examination employed. The includes a quantitative determination of the action reagents as strong caustic soda and nitric and ic acids upon the fibres, the results of which furnish ata for a chemical classification of the fibres. It ıtains the results of the determinations of the per- of cellulose, and also the carbon percentage of materials. The latter especially the authors have ıf great value, as it enables them to classify the one or other of the two groups of celluloses, viz., llulose and pecto-cellulose.

carbon percentages were estimated by a very rapid urate method, that of combustion with a mixture of chromic and sulphuric acids, and an estimation of the volume of mixed gases (carbon dioxide and carbon monoxide) evolved.

The microscopical examination embraced a determination of the dimensions of the ultimate fibres as occurring in the isolated cellulose, and an observation of the form of the fibres as seen in transverse section.

The difficulty of preparing sufficiently thin sections was overcome by making the fibres into a pencil with asphalte, which, when sufficiently dry, could be readily cut with an ordinary razor. The microscopical features of the more important fibres are shown by means of micro-photographs, some of which are excellent.

The micro-photographic apparatus employed, which possesses several advantages over those in ordinary use, is fully described and illustrated.

Part II. contains a detailed account of each fibre, with its botanical description, and its industrial applications.

Part III., which is almost entirely from the pen of Dr. Watt, is descriptive of the more important seed, hairs, and flosses occurring in India.

We may, in conclusion, congratulate Mr. Joynson and those associated with him on their public spirit in undertaking such a laborious investigation. The work should prove valuable for reference by those engaged in the cultivation and commerce of fibrous materials.

Trade Notes.

BABBITT'S SOFT METAL BEARINGS.—Copper, 4lbs.; antimony, 8lbs.; tin, 96lbs.

CHANGE OF NAME.—The Council of the Society of Telegraph Engineers and of Electricians has definitely decided upon the alteration of the name of the Society to "The Institution of Electrical Engineers."

OFFICIAL.—We have received a copy of the *Board of Trade Journal* for December. It contains the latest official notices relating to the Merchandise Marks Act, the new quarantine and Post-office notices, and details respecting recent changes in the tariffs and Customs regulations of various countries. The details of the new tariff of Indo-China, showing where it differs from the French general tariff, and a further instalment of the new Brazilian Customs tariff, are also given, with the usual statistical matter, extracts from consular and other reports, and general information on commercial affairs.

A. G. KURTZ & CO. *v.* PETER SPENCE & SONS.—The hearing of this action is now concluded. Mr. T. Aston, Q.C., in continuation of his remarks in replying on the whole case on behalf of Messrs. Spence and Sons, submitted that the defendants' description of their invention was sufficient.—In the course of the learned counsel's argument, the learned Judge said: I am satisfied that if patentees would take the trouble and bear the expense of consulting gentlemen like yourself, who are acquainted with drafting and acquainted with the mode of expressing themselves in technical language, they would save themselves not a few pounds, but many hundreds of pounds, and very likely great risk into the bargain.—Mr. Aston said that if specifications were so good that there was not a hole in them, he should not be there.—His Lordship: Well, there is that consolation certainly for you. (Renewed laughter.)—Mr. Aston proceeded to deal with the evidence. In conclusion, he asked his Lordship to hold that the defendants' patent was a valid one; that the plaintiffs by the use of Kynaston's patent had infringed the defendants' legal rights; and that Messrs. Spence were entitled to judgment upon all the issues that had been raised in the suit.—His Lordship then said: I will endeavour to give judgment in this case before the courts rise for the Christmas vacation, but I can make no promise in the matter.

Correspondence.

ANSWERS TO CORRESPONDENTS.

Our Correspondence has now increased so largely that we cannot continue to reply to all through the post.

H. F.—A anthracene is chiefly procured from Newcastle coal, and contains less paraffin and other impurities difficult of removal. B anthracene is produced from Lancashire and Yorkshire coal, and from that of other districts. In fact, if not made from Newcastle coal it is sure to be branded "B" without examination.

INSTITUTE.—We quite agree with your opinions, but the letter is libellous, and therefore we cannot reproduce it.

B. H. T.—St. Claire Deville's furnace may be found illustrated in Aydon's paper, read before the Inst. C. E., mentioned in the articles

TIPPING.—Your apologies for the continuance of the system of giving presents will not hold good. We could point to very many cases wherein the proprietors have been frightfully robbed—and we shall do so, by-and-by.

FRANK.—Thirty-six to thirty-one.

A READER (No. 1).—Take the sample to an analytical chemist of repute; you surely could not think of deciding such a ticklish question yourself

A READER (No. 2).—We do not believe in his opinions or in his experiments. The ratepayers should demand to know where he had gained his experience in that special line.

SUBSCRIBER (No. 1).—We note what you say with regard to borax, but we cannot give a gratuitous advertisement.

SUBSCRIBER (No. 2).—We believe that water gas can be made in the works wherein it is to be used for less than sixpence per thousand cubic feet.

NOTICE.—We would respectfully ask our correspondents to select more distinctive *noms-de-plume* than A READER or A SUBSCRIBER; for reasons see above.

*** *We do not hold ourselves responsible for the views expressed by our correspondents.*

ALCOHOLIC POTASH.

To the Editor of the Chemical Trade Journal.

Sir,—It seems to me quite evident that Mr. E. W. T. Jones starts with quite a different raw material to that I have worked with. I have saturated ordinary alcohol with solid potash and with solid soda until it has been of the consistency and colour of treacle, and after keeping it some weeks have distilled it, and when this distillate has been saturated with potash, in a short time it has turned almost as brown as before.—I am, &c., J. CARTER BELL.

To the Editor of the Chemical Trade Journal.

Sir,—In reading Mr. E. W. T. Jones's letter upon the above subject, I have come to the conclusion that he has found a better source of alcohol than I have been able to obtain. I have met with the same difficulty that Mr. J. Carter Bell complains of, and to this day have not been able to overcome it. I have digested the alcohol 60 O.P. with solid potash, and distilled several times, but all to no purpose, as, after making up the alcoholic potash with such alcohol, the solution will go brown in a few days in spite of me. The other day I applied to a well-known firm for alcohol "that would not go brown with potash," but when it arrived it turned out to be far worse than my own. I shall certainly try Mr. Bell's "tip."—Yours, &c.,

F. I. C.

WATER GAS.

To the Editor of the Chemical Trade Journal.

Sir,—With reference to the inquiry of your correspondent in last week's issue of the *Journal*, I may say that the water gas made here is caused to smell by the introduction of coal tar naphtha into the gasholder.

This precaution is only necessary in the case of the gas which is purified by lime for illuminating purposes. For heating purposes in my own house unpurified gas is used, but no smell whatever results from this unless there is a leak in a pipe, when the smallest escape causes a powerful stench.

This is as it ought to be—the gas cannot have too pungent an odour before combustion.

Several chemists have smelt the purified gas as it issues from a gas burner, and endorsed my opinion that it is sufficiently odorous.

In the United States this gas is used in tens of thousands of houses, and at a recent exhibition where water-gas plant was exhibited, the judges embodied the following remarks in their report on the subject:—

"Much stress has been laid by certain writers upon the poisonous effects of water gas due to the large percentage of carbon monoxide which it contains, and which is held to constitute a serious objection to its introduction. This objection the judges do not deem sufficient to warrant the condemnation of an agent which promises to serve so many useful purposes. The same objection was made to coal gas by those who opposed its first introduction, and with as much justification as the opponents of water gas have at present. For the purpose of asphyxiation, either coal gas or water gas will answer quite satisfactorily."—I am, sir, yours respectfully, A. WILSON.

THE INSTITUTE OF CHEMISTRY.

To the Editor of the Chemical Trade Journal.

Sir,—I am very pleased to see that someone is prepared to ventilate the question of the usefulness of that moribund association the Institute of Chemistry. Time flies so rapidly that, although one of the promoters of the scheme at its first inception, I had forgotten that it was over ten years since. As your correspondent rightly says, it is quite time to cast a glance back and see what the Institute has accomplished in its first decade.

My own impression is that it is dying, and can only be kept together by artificial means; for instance, what does this advertisement signify?:—

INSTITUTE OF CHEMISTRY.

Notice as to the Admission of Fellows and Associates.

The Council are prepared to consider evidence of training and qualification, other than that afforded by examination, in the case of persons desirous of becoming Fellows or Associates of the Institute, who have been for some time past engaged in the practice of professional chemistry, and who make application to be admitted before the next anniversary meeting of the Institute, March 1st, 1888.

Forms of application, with copies of the bye laws (as allowed by the Privy Council, February 24th, 1887), copies of the charter, lists of Fellows, and other information can be had on application, by letter, to the Secretary.

By order of the Council,

CHARLES E. GROVES.

9, Adelphi Terrace, London, W.C.

I read it that Fellows and Associates may now be admitted *without examination*. A sorry spectacle forsooth to poke under the eyes of all those engaged in the chemical industries. Pray, sir, what have we paid our *twenty guineas for*, and for what purpose have many of us undergone examination? Is it simply to defray expenses of offices and to pay officials high salaries for doing nothing? It seems so to me, for what other good have we gained by our Fellowship? Instead of letting in members free, the only business-like way of treating late arrivals would be to make them pay as entrance fees the exact sum which all other Fellows have had to "shell out." There is an old adage which says that he who gives quickly gives twice. I think this is more than proved in the present instance. For my own part I would alter it to "he that gives quickly gives twenty times."

I can well picture all the officials of the "INSTITUTE" sitting in full state in London to kindly receive these Fellows entering *without examination*, and without having to share in the responsibilities and expenses which others before them have had to pay, and I sometimes think we have not done wisely as Fellows in our selection of members of council. We want men who will work, and I for one would be prepared to say to those who now hold office, "Move out of the way and let the procession pass on."—I am, &c., A DISGUSTED FELLOW.

THE DETERMINATION OF MINUTE QUANTITIES OF IRON.

For many purposes, such as the use of water in the operations of dyeing, bleaching and calico-printing, and even paper-making; and for the valuation of soda-ash, alum, alum-cake, and many other chemicals, so as to estimate their relative fitness for delicate operations, a rapid and accurate method for the estimation of minute quantities of iron would be of great value. Ordinary gravimetric analysis or estimation by weight, and even the simple and well-known volumetric methods, are hardly applicable, as the presence of other substances militates against the accuracy of the ordinary methods when minute quantities are concerned.

The following method is a modification of one well known in technical laboratories for many years, and is simple and accurate, providing that the details are strictly attended to. The solutions required are:—

Strong Nitric Acid.—Mix 50 c.c. of pure nitric acid Sp. Gr. 1·42 with 50 c.c of pure distilled water.

Diluted Hydrochloric Acid.—Take 10 c.c. of pure hydrochloric acid and dilute with pure distilled water until the whole measures 100 c.c.

Ferrocyanide of Potassium Solution.—Take 4 grammes of pure ferrocyanide of potassium, dissolve in a little water, and make up to 100 c.c.

The Standard Iron Solution.—Take one gramme of pure iron wire, dissolve in 10 c.c. of pure hydrochloric acid, add 5 c.c. of pure strong nitric acid, and evaporate to dryness in a porcelain capsule on the water bath, take up with 5 c.c. of pure hydrochloric acid Sp. Gr. 1·20 and evaporate again to 2 c.c. Take up with water and dilute to one litre.

This strong solution will keep fairly well, and requires dilution for use. The solution of correct strength is made by taking 10 c.c. of the foregoing, and diluting it to one litre. Each c.c. contains 0·01 ($\frac{1}{100}$) of a milligramme of metallic iron.

Having prepared the foregoing solutions, we may now proceed to test a sample of water for iron.

Take 70 c.c. of the water (say the water of the ordinary domestic supply, or from the nearest stream), and evaporate it in a platinum dish upon the water bath, to dryness, ignite the dish gently over the Bunsen burner, to destroy organic matter, and after cooling add 1 c.c. of the nitric acid solution, evaporate on the water bath, and take up with 1 c.c. of the dilute hydrochloric acid, add water, filter, and make up to 50 c.c. Now take a small beaker, and place therein 1 c.c. of the ferrocyanide solution, and pour in quickly the 50 c.c. of the prepared water mentioned above, when a blue solution of more or less intensity will be produced. Allow to stand for half-an-hour before estimating the colour intensity.

In order to determine the amount of iron present by colour, the solution must be poured into a clean thin glass tube, such as is used in "Nesslerizing" waters, and the colour compared with that produced by known quantities of the standard iron solution. A few trials will here be found necessary. Suppose, for instance, the operator takes 5 c.c. of the standard iron solution for the first comparison, he must add to this 5 c.c., 1 c.c. of the dilute hydrochloric acid, and make up to 50 c.c. Now add this 50 c.c. to 1 c.c. of the ferrocyanide solution, mix well, and pour into the "Nessler" tube for comparison, after standing for half-an-hour. It may be that the exact colour shade has been hit, but, if not, other tubes must be made up until the exact shade has been found. Every c c. of the standard iron solution required to produce a similar tint to that of the water operated upon represents 0·01 grain of metallic iron in the gallon.

Mr. J. W. Lovibond's "Tintometer" would come in very handy in such operations as these, where shades of one colour have to be compared. We believe Dr. Carnelly once described a method very similar to the above, but we have been unable to lay our hands upon the paper.

THE LIVERPOOL COLOUR MARKET.

The market has not seen much alteration during the past week. Ochres: Oxfordshire, £10, £12, £14, and £16; Derbyshire, 50s. to 55s. Welsh, best, 50s. to 55s.; seconds, 47s. 6d.; and common, 18s.; Irish, 45s.; Devonshire, 40s. to 45s.; French, J.C., 55s. to 60s.; M.C., 65s. to 67s. 6d. Umber: Turkish, cargoes to arrive, 40s. to 50s.; Devonshire, 50s. to 55s. White Lead, £17. Red Lead, £16. Oxide of Zinc: V.M., No. 1, £19; V.M., No. 2, £18. Venetian Red, £6. 10s. Cobalt: Prepared Oxide, 8s.; black, 7s. 3d; blue, 6s. 6d. Zaffres: No. 1, 3s. 6d.; No. 2, 2s. 6d. Terra Alba: Finest white, 60s.; good, 40s. to 50s. Rouge: Best, £24; ditto lb. jewellers, 1s. per lb. Drop Black, 25s. to 28s. 6d. Paris White, 60s. Emerald Green, 10d. per lb. Derbyshire Red, 60s. Vermillionette, 10d. per lb.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday.

On the whole the rougher lines have been rather weaker for spot dealing, soda crystals, caustic soda (all sorts), and bleaching powder being the turning down. A few are slightly firmer, as for example, saltcake and nitrate of soda; while sulphate of ammonia, without much of actual bulk in the transactions realised, has fully held the marks of a week ago. A fair number of parcels have been sold at £12 for delivery within the first quarter of the year. Paraffin chemicals continue healthy all round, and last week's improved quotations are amply maintained, with perhaps an added something to the good. Bichromates (potash and soda both) have been experiencing a slowly mending demand, which bettering, however, is not quite so apparent in the department of the home supply as in the continental section of the custom. Scotch general trade is certainly pulling itself together again, and Clyde shipbuilding, which exercises some influence upon all the other local industries, has of late weeks been making most gratifying strides. Chief prices current are:—Soda crystals, 41s. 6d. net Tyne; alum, £5, less 2½% Glasgow; borax, English refined, £31, and boracic acid £46 net Glasgow; soda ash, 48/52°, 1d., less 5% Tyne; caustic soda, white, 76° £9, 70/72° £7. 2s. 6d., 60/62° £6. 2s. 6d., and cream, 60/62° £6, less 2½% Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52°, 1⅛d., less 2½% Tyne; saltcake, 22s., less 2½% f.o.r. Glasgow; bleaching powder, £8, less 5% f.o.r. Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5 and 6% to Scotch and English respectively; nitrate of soda, 8s. 10½d. to 9s. 1½d.; chlorate of potash, 6¼d., less 5% any port; sulphate of ammonia, £11. 15s. to £11. 17s. 6d. f.o.b. Leith; paraffin scale, hard 2½d., soft 2d.; paraffin wax, 120° semi-refined, 3⅛d., and remelted, 2¼d; paraffin spirit, 7½d.; burning oil (mineral), 5d. to 6½d.; lubricating (mineral), 865° £5. 15s., 885°-890° £6. 10s. to £7. 10s.; sulphate of copper, £22, less 5% Liverpool. West Coast imports last week included 400 tons pyrites, 1,760 tons nickel ore, and 60,180 bags sugar, the last named at Greenock.

THE MISCELLANEOUS CHEMICAL MARKET.

Business is, to some extent, interrupted by the near approach of the holidays and general stocktakings. Prices, however, are firm, and the advances obtained in some branches of the trade may probably be the sign of a more general improvement in trade yet to come. Ammonia salts are in good demand, and sulphate has advanced during the week. Potash, carbonate and caustic, is selling freely. Soda products are lower in Lancashire, caustic soda all round having declined about 2s. 6d. per ton. Acetates of lime and lead are firmer—the former having

advanced upon last week's quotations. Lead remains firm at the advanced prices, and has its effect upon litharge and other products. Copper sulphate is irregular, makers quoting £25, but small resale parcels offering at less. Coal tar distillers are busy, and products are in good demand. Bleaching powder has been a shade weaker in price, but most of the works are fully engaged with orders. Carbolic acids of all kinds are moving off freely. Picric acid 1s. 5d. per lb ; tartaric acid is rather dearer. Prussiates and bichromates of potash are well maintained and in good demand. Chromic acid 4½d. per lb. Nitrate of soda is dearer, and selling freely at 9s. 3d. (Liverpool) for best quality. Superphosphates are meeting with large demand.

THE ALKALI TRADE.

Sodas, if they have not fallen, are certainly weaker, and quotations still continue to be made to the North British Paper Makers at much below present rates. Bleaching powder is firm, and the make is passing off freely, while there is a steady demand for bleaching liquor. "Tower salts," or 28° Tw. muriatic acid, having been raised to 7d. per carboy at the makers' works for next year's delivery, is causing some ill-feeling amongst bleachers and dyers, which, in the end, is certain to cause disaster to the "salts" trade.

THE TAR PRODUCTS MARKET.

Benzoles are reported firmer, and we are not surprised at this, seeing that so far there has not been as much tar made this year as last in many works, and what is more, the "Talk" carbonising works are only just getting under weigh. In the course of the next month, benzol will actually have been made, though only on a scale equal to half the quantity originally intended, and if this be kept in store until a sufficient scarcity shall have shown itself, who can tell what the result will be in the end? 90's benzol is value for 3s. 1d., and 50/90's 2s. 6d. Solvent naphtha, crude carbolic, and anthracene all maintain their prices, but pitch is now so low that many tar-distillers are realising but 4s. per ton at their works.

THE SULPHATE OF AMMONIA MARKET.

The market is very firm, and £12. 5s. is mentioned as being the value at Hull, though it is quite possible £12. 7s. 6d. may be realised before the end of the month; still, makers should be very cautious, and not endeavour to push prices to an extreme limit, as the present rise is simply due to the failing of a speculator to deliver. Beckton price is nominally £12. 10s. for January, but we cannot hear of any business at this figure. Leith is firm, at £12. 2s. 6d. Similar prices are ruling at Liverpool, while London outside makes are fetching £12. 2s. 6d.

THE PATENT LIST.

The following list has been compiled expressly for The Chemical Trade Journal, *by* G. F. Redfern & Co., *Patents Agents, 4, South Street, Finsbury, London, E.C.*

APPLICATIONS FOR LETTERS PATENT.

16582. J. Dempster. For improvements in apparatus employed in the continuous production or distillation of gas, and other products from coal and other materials and minerals. Dec. 2.

16732. E. Breyer. For improvements relating to the purification of saccharine juices, glycerine, oil, alcohol, and analogous substances. Dec. 5.

16783. C. F. Hengst. For smokeless gunpowder. Dec. 6.

16805. W. T. Walker. For improvements in distillatory apparatus for use in chemical operations. Dec. 6.

16806. W. T. Walker. For an improved apparatus to be used in chemical operations where it is required to drive off from liquids volatile constituents thereof. Dec. 6.

16810 R. Chadwick and J. W. C. Chadwick. For improved colouring matter for dyeing, painting, staining, or printing. Dec. 6.

16920. A. V. Newton. A communication from A. Nobel, of France. For an improved explosive compound. Dec. 8.

17050. W. H. Beck. A communication from P. de Lachomette, of France. For new or improved process and apparatus for the manufacture of sulphite and bi-sulphite of ammonia. Dec. 10.

17073. W. Mason and C. J. Whittaker. For improvements in the process and apparatus for the manufacture of soda and ammonia salts by the ammonia-alkali process. Dec. 12.

17095. W. White and A. Rickman. For improvements in the packing of acids. Dec. 12.

17167. J. Y. Johnson. A communication from F. C. Glaser, of Germany. For improvements in the manufacture of explosives. Dec. 13.

17255. D. Herman. For improvements in condensers and towers for the condensation of acid and corrosive gases. Dec. 15.

17290. A. Knoop. For improvements in, and relating to, apparatus for evaporating or rectifying alcohol, and for similar purposes. Dec. 15.

"Materiam Superabat Opus."—The London correspondent of the *Manchester Guardian* writes:—"In the name of Sir Henry Roscoe an injustice has been done this evening at the meeting of the Metropolitan Board of Works to the London public. The Board, it is said, passed a resolution that Sir Henry's report upon the deodorisation of London sewage at the outfalls and upon the state of the Thames should be printed for circulation 'amongst the members of the Board *only*.' We should all like to learn what Sir Henry has to say upon an undertaking of which the public know nothing, on which there are at present 2,200 men employed, and the cost of which upon completion next year will be about £500,000. The works are certainly experimental, and interest the whole country. They include thirteen precipitating tanks, a pier and jetty for discharging the sludge into specially-designed ships, in which it is to be carried out to sea for discharge upon the junction of the Channel with the German Ocean. There is a store for sludge in case of the ships being delayed by stress of weather. This may certainly increase the take of fish, but it cannot be the last word as to the disposal of London sewage, and there is a strong feeling that the ratepayers ought to have not only Sir Henry Roscoe's opinion, but every other possible information with regard to the character, utility, and progress of the works."

The correspondent in question is a little bit wrong. The disposal of the London sewage does not *interest* the whole country. The country would never look to London for a solution of the sewage difficulty; but provincial engineers are *inquisitive* to know how much more money will be fooled away before those in authority put a stop to this wasteful expenditure. A complete history of the London sewage, and the whole of the expenditure upon it, would form an interesting and startling work. Will someone undertake it?

The Chemical Trade Journal,

SATURDAY, DECEMBER 31, 1887.

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TO ADVERTISERS.

SPECIAL NEW YEAR'S NUMBER OF THE CHEMICAL TRADE JOURNAL.

In the first week of the approaching New Year we shall issue a SPECIAL NUMBER of the Journal. We propose to bring our first volume to a close with the last Saturday in December, 1887. The issue of January 7th, 1888 (No. 33), will commence Volume II. It will be an enlarged special number of very general interest. We shall issue along with it a Title-page and Index for the first volume, together with a neat and useful Office Almanac, suitable for our subscribers, which is now in course of preparation.

Including our regular subscribers, our New Year's Number will be issued to NOT LESS THAN 10,000 FIRMS AND INDIVIDUALS, so that intending advertisers will see at once that this issue is worthy of their special attention.

We may explain that, in our Publishing Department, we possess very carefully-compiled lists—in most cases the result of special knowledge and information at our command—of every firm of repute, both at home and in the main trading centres abroad, connected with the various industries whose interests it is our province to serve. We utilise these lists week by week, by selecting a number of them in turn, and sending out free copies of the Journal to those firms who have not yet become annual subscribers. The result is that almost every day brings us a fresh batch of subscribers. We shall continue this process until we arrive at what we consider our normal circulation, and that we have fixed at a tolerably high figure. On the occasion of New Year's Special Number we shall MAKE USE OF THE WHOLE OF THE LISTS WE HAVE REFERRED TO, numbering altogether, as we have stated, not less than 10,000 names.

Of course, for this special issue there will be special prices for advertisements; but those who order a series, either commencing with that number, or previously, will have the advantage at our regular tariff rates of bringing their specialities under the notice of a very large circle of buyers.

THE BRITISH GLASS BOTTLE TRADE.

Years ago glass bottlemaking was a widespread business in Great Britain. It has, however, fallen away of late years, and many works, both in England and Scotland, have been forced to close, and the trade has altogether died out in localities where it was wont to flourish vigorously. The reason assigned for the great decline of the industry in this country is said to be owing to cheaper labour on the continent, and the longer hours the men work there. That which was to revolutionise the trade and bring it back to England, was properly enough to be a novel adaptation of a new English machine to the old-fashioned handicraft of the glass-blower. The labour cost of a gross of English beer bottles is said to be about 3s. 10d., and by means of the invention referred to below, this first cost was to be cut down to 3d., and ultimately to 1d. a gross. The continental margin of profit was to be wiped out at one sweep.

At Castleford, the other day, a specially-arranged for party was shown over the glass manufactory of Messrs. Sykes, Macvay, and Co. Limited. Here it was, after having inspected the antiquated and still continued method of ordinary bottle-blowing, they were shown the newly-invented machine of Mr. Howard M. Ashley, which was to revolutionise the trade. Made by hand, a bottle requires to be dealt with by five workmen. One dips the tube in the molten glass, rolls up enough to make a bottle, and carries it to a second man, who rolls, blows out, and moulds the bottle, whilst a lad cuts off the neck part. It is then taken to the furnace, where another man runs on the lip or nozzle of the bottle. The new machine—which is not yet in the fully completed work-a-day form, but is yet advanced enough to show the principle—begins the manufacture of the bottle at the neck and lip end, so that when it leaves the apparatus it is a finished article, only requiring to be annealed. The rough outline of the machine is like an Ionic cross. The molten glass necessary to make a bottle is poured into an iron mould. From underneath a plunger rises, shapes the mouth and lip of the bottle, a gentle puff of air ascending through the hollow plunger, which is closed with a button valve. The plunger is then withdrawn, the cross makes half a turn, and the lump of soft, red-hot glass droops till it rests on a plate wrought to form the bottle. Whilst this is taking place the two arms of the cross are drawn inwards, until the reverse halves of the entire outer mould of the bottle, which they hold tightly, inlocks the glass. This operation releases the full force of a current of air, which, at a pressure of 50lb., comes along a small pipe from a reservoir, passes through the ducts in the machine, then through the plunger button, and distends the glass until it swells and fills the whole interior of the mould. The machine is then reversed, and the finished bottle removed in the space of about six seconds. There was but one moulding apparatus in the machine shown, but four, six, and eight mould automatic bottle makers are being manufactured, which are to rotate on a central vertical shaft, and in this way it is claimed that from sixteen to twenty-four bottles a minute can be made with an improved molten glass feed, which is to be attached. The reduction of the cost of labour from 3s. 10d. a gross to 3d. per gross will ensure, it is asserted, the revival throughout the United Kingdom of the once busy bottle-makers' trade.

Legal.

DISPUTED VALIDITY OF A PATENT.

A. G. KURTZ & CO. *v.* PETER SPENCE & CO.

Expert Evidence (continued).

Mr. David Basil Hewitt, Sworn.

Examined by Mr. Aston.

I believe you are a doctor of medicine, and a member of the Institute of Chemistry, and have had a large experience in chemical practice? —Yes.

I believe you have had opportunities of becoming acquainted with the properties of Weldon mud?—I have.

You know what it is?—I do.

You heard the explanations given before my Lord as to the conditions under which Melton mud was formed?—I did.

That it consists largely of peroxide of manganese with some protoxide of manganese, and some other matters?—Yes, it is a mixture.

And that the protoxide could by well known means, in 1882, be converted into protoxide so as to have all the oxide of manganese present converted into peroxide, if people are minded so to do?—Will you please repeat that.

That it was well known in 1882 that you could operate upon the protoxide in Weldon mud if minded so to do, and convert it into peroxide?—Yes.

By the addition of hypochlorite of lime or bleaching powder?—It could.

May I say that it was very well known in 1882?

Mr. Moulton: Please do not lead too much. I do not want to interfere.

Mr. Aston: I will lead nothing my Lord, except what is common ground between us.

Mr. Justice Kekewich: Well go on. It was only a caution.

Mr. Aston: Was it well known in 1882 that manganese had a strong affinity, or property, for associating with iron?—It was very well known.

Now you have read the specification of Mr. Spence?—I have.

That specification tells you that for the purpose of removing iron from solutions of sulphate of alumina you should use peroxide of manganese?—Yes.

Was that as far as you knew in 1882?—It was.

Now he begins by telling you, does he not, that peroxide which he uses he prepares artificially?—Yes.

And he tells you that he prepared it artificially in a way analogous to that employed in preparing Weldon mud?—Yes.

And he tells you to complete the operation by complete oxidation?—He does.

Will you take the specification before you?—I have it.

In the case of the oxide of manganese in the Weldon mud or analogous manganese manufactured material it would be converted into a peroxide if it was completely oxidised?—Yes, if it was completely oxidised it would be all converted into peroxide.

We were told yesterday, and it is common ground, I believe, between us, that the condition of the peroxide may be fairly described as hydrated peroxide of manganese or manganite of hydrogen?—Yes; reading the specification I should not consider that it would naturally apply to anything else, that is in the body of the specification, but to an artificially prepared oxide of manganese.

An artificially prepared oxide of manganese being in the state of a peroxide?—Yes.

Now in that condition what would be the physical state of the peroxide of manganese molecules?—The physical *state of all precipitates* made in this way by chemical *action is that of very minute* subdivision. The particles are very minutely subdivided, in a very many instances, and especially in this.

In that condition is it a favourable or an unfavourable condition for operating upon iron which it is desired to remove from the solution?—It is a most favourable condition, because contact between the ultimate molecules of bodies is absolutely necessary for chemical action.

Was that well known in 1882? It is known to all chemists that you must, to bring two bodies together, have them in a state suitable for contact.

If you can answer me shortly in the negative or affirmative, will you favour me by so doing, that I may not take up my Lord's time at too great a length. Did you say the intimacy of contact?—Intimacy of contact.

And in order to have intimacy of contact, say between the iron in the solution and the peroxide of manganese, you must have the peroxide in what condition?—In a state of very fine division, and that will quicken the action always.

That will quicken the action of the particles *inter se*, but would they be injuriously affected afterwards, or in a condition to enable them to disseminate or operate upon the iron?

Mr. Moulton: My Lord, really this is putting a man's proof to him in very long sentences.

Mr. Justice Kekewich: It is very long.

Mr. Aston: Tell my Lord what you say.

Mr. Justice Kekewich: As an ordinary rule, where you have got an expert he comes to swear certain things; you know he has made up his mind.

Mr. Aston: Especially, my Lord, where I am examining against time.

Mr. Moulton: There is no examination as against time. This case has to be tried out properly.

Mr. Justice Kekewich: If you have reason to suppose from what you intend to say that it is going beyond reasonable license you will take the objection, otherwise the sooner this gentleman says in the plainest terms what he has to say, and you are ready to cross-examine him, the better.

Mr. Aston: Now, Dr. Hewitt, you have your papers of experiments with you, have you not?—I have not got them here, but I made my experiments on a systematic plan, which I shall explain to the Court.

I will ask about the details of your experiments presently. You have experimented upon the artificially prepared peroxide in the way directed in the specification?—I have.

And in the proportions indicated in the specification?—I have.

And in those experiments what result did you obtain?—My first experiment was made with natural manganese ore.

Would you kindly refer to the artificial first, please?

Mr. Justice Kekewich: No; he says that is his first experiment. Let us have them in order.

The Witness: In that experiment I found, on taking a portion of what is known in the trade as manganese ore, and getting it both triturated and levigated down to a state of fine division, I found that it removed a certain proportion of the iron, but it did not remove it altogether, and I then investigated the condition of the ore which I used, and I found, upon referring to the analysis of manganese, that the quantity of oxide of iron contained in it varied very much. Therefore, I thought it was perfectly possible that one natural ore might remove the oxide of iron, and another natural ore not remove it.

Mr. Justice Kekewich: When you say you examined the ore which you used, I suppose you mean that you examined some from the same heap as the ore which had been actually used?—I used a proportion, my Lord, of the same that I had previously put in the alum solution.

You examined it?—I examined it, and found iron in it.

Now, Dr. Hewitt, if you could have separated the iron from that ore so as to leave it a comparatively pure peroxide, and if you had finely triturated or comminuted that and applied it, what, in your experience as a chemist,

have been the result?—My future experiments me what the result would be, namely, that when is removed from the peroxide, the power of the ese to remove the oxide of iron from the alum is very largely increased.

of all, tell my Lord in what condition physically oxide ore is relatively to its environment—that is, undings?—In the natural ore, my Lord, it is a ce which varies in hardness from about 2 of hard- 6½, according to the various places where the ore . Some ore, like the pyrolusite, is soft, and some tremely hard; and, of course, the softer the ore is e easily you get it to the state of fine division.

that known in 1882?—It was. I might say it was lmost before I was born.

nswer the question, and then I will pass on. Now, made this experiment with the natural ore—the nated ore—what else did you do?—I then pro- to act entirely within the specification, following of direction given.

just tell us what result you obtained?—When the Weldon mud was washed from chloride of calcium, afterwards oxidised with bleaching powder, I took of that containing 6 parts by weight of peroxide anese, and I treated a solution containing 100 weight of dry cake; I added very gradually the ese so prepared to the solution, shaking the solution ch addition, and I continued that in the first ent for the period of an hour, and that mud so .

nean Weldon mud?—Yes, Weldon mud so pre- moved almost entirely the oxide of iron from the ution.

vhat, in your opinion as a chemist, was the active at enabled the iron to be removed?—My experi- owed that it was the peroxide of manganese.

you any doubt about it?—I have none.

lid you repeat that experiment on other occasions? hird experiment I made was to take the same n of the mud and wash it with nitric acid in the l remove from it the lime.

would the residue in that case be?—It removed both the lime and the protoxide of manganese, residue in that case would be water and $Mn\,O_2$, e other slight impurities. The silica would remain. cally it was—what?—Practically to all intents oses it was peroxide of manganese.

what was the result in that case?—In that case t of the experiment was that the exact 6 parts remove the whole of the iron, but a larger pro- f it.

stice Kekewich: Can you state the proportion?— te the proportion I had to use in order to remove e, my Lord. It was 7½ parts to the 100 instead vish to qualify that, for the whole of that experi- s completed in about 24 hours, and I am not at n that if I had gone on with it longer and agitated ould not have got more down. I give the exact what I found.

ton: Was it known by chemists in 1882 that you ease the efficiency of a chemical re-action by the agents to act for a longer time?—Oh, yes.

vas common knowledge?—Yes, common know-

suppose there is another way of providing for the action, namely, by increasing the proportions ive agent?—That is so.

very well known?—That is very well known.

pplying those rules to your former experiment; ny Lord that with the native peroxide you did e so large a quantity, I will [illegible] of the iron, as ith the hydrated peroxide an[illegible]ally produced?—

ng you had increased you[illegible]ntities of the xide and ensured that it [illegible] as far as you could ensure, a peroxide uncontaminated; and that you had triturated that finely and increased the proportions, and also increased the length of time of the operation, what do you say would have been the consequence?—I would expect that I might obtain a perfect removal, but I would not state on my oath that it would be so. I have never tried it.

No, certainly; but, in your opinion, what would be the consequence?—By analogy from the usual chemical action you might get it, but I would not say that you could always get it.

Now you have told my Lord of two experiments; did you make any experiments in which you employed the peroxide of manganese in an anhydrous condition?—I did. I took some of that which had been washed with nitric acid, and I boiled that down, and carefully heated it to between 300 and 350 Centigrade degrees, and I then experimented with the resulting dry product.

Dry what?—Dry product. I experimented with the resulting dry product.

What was that dry product?—Well, it contained of course a mixture as before, purified from the lime, and from the protoxide, but it contained a slight quantity as I found in the drying—probably a slight quantity—of organic matter—a very small trace.

Could it fairly be called anhydrous?

Mr. Moulton; Pray let him finish.

Mr. Justice Kekewich: Mr. Moulton's interruption was justified. The witness was in the course of telling what it contained, and you, Mr. Aston, have asked him something else.

Mr. Aston: Because I wanted something else.

Mr. Justice Kekewich: That is not fair.

The Witness: I simply proceeded with that, as I had done with the previous experiment.

Mr. Justice Kekewich: But you were telling us what it contained?—I found that it contained peroxide of manganese and protoxide of manganese again. A portion of the peroxide had been decomposed by the heat, which was nearly 350 deg., and which had driven off a portion of the oxygen from that which was peroxide before.

Mr. Aston: What was its physical condition?—Its physical condition was of course now, before I reduced it to powder again, in little hard pieces. As things are dried they dry into a hard cake, and I had to take the hard cake, and again reduced it to powder, but it reduced to a powder in a very much easier manner than the natural mineral.

Would that be a thing well-known in 1882?—Oh, yes.

Oh yes, you say?—That is, I mean it would dry into hard lumps and that it would require to be powdered up again. I made it practically back into mud again.

Now, perhaps, I may put the question. Was that hydrated or anhydrous peroxide?—That is a question I am not prepared to be positive upon. I consider that according to all the rules that I can find it was really anhydrous. If it is possible to make anhydrous oxide artificially then I say it was anhydrous, but if it is not possible to make it artificially without decomposing it back to the protoxide, then of course it was not anhydrous. I have myself some doubts how far you can make anhydrous peroxide of manganese without carrying through the decomposition. I have not tried it, as Dr. Hurter said, I have not undertaken a research whether by drying down the mud all the water could be eliminated from it. Therefore I cannot swear on my oath, but I have taken the best known means, and to go beyond the temperature of which chemists speak, for removing any combination of loosely combined water.

Mr. Aston: So far as you were able to effect the object, had you driven off the proportion of water that was formerly in the hydrated peroxide?—I had as far as I knew, to the best of my ability.

Did you make any other experiments?—I did.

What were those?—I was interested to observe whether any other method of using manganese or oxide of manganese would be equally successful to the Weldon mud, and

I procured a sulphate of the protoxide of manganese crystallised and pure, and I percipitated that by means of the hypochloride of soda.

That is bleaching powder?—Yes, a solution of bleaching powder. Then I had that carefully washed; just as I had done the mud, to be certain that it was peroxide and not protoxide, and I then treated the solution of alum with that of 6 parts, and I got about the same result as I did with the Weldon mud when washed with nitric acid.

Namely, a removal of about what per cent of the iron?—Something over 60 per cent of the iron with the 6 parts.

Did you increase the quantities?—I did up to 10 parts.

With what results?—With the results that I almost totally removed the iron, and left a mere trace.

Now supposing that you desired to remove all the iron, was it well-known—you answered the question before, I think—in 1882, that by increasing your proportions you would be likely to effect your object?—Do you mean with respect to this particular operation—I knew nothing about it before 1882—I knew nothing about it until I saw the specification.

But was it well-known in 1882, that by increasing the active agent you might expect to obtain—?—A more perfect action, yes.

Mr. Justice Kekewich: You asked that before, and he answered yes.

Mr. Aston: Did you make any other experiment, Dr. Hewitt, that you remember?—No, that concludes them.

Now founded upon those experiments what do you say as to the directions given in the specification by the patentees for effecting their object?—I approached this patent not as an analytical chemist but as a manufacturer, and I simply made the experiments that I as a chemical manufacturer would consider it necessary for me to make if I was going to be an alum manufacturer. I do not profess that I went into this as a research, but simply as a systematic experiment such as a manufacturer would try to see whether he could work out the process or not as an alum manufacturer. I am not an alum manufacturer, but I have made sulphuric acid from the salts of soda, and I know the process that ought to be taken to investigate.

The business of your life is that of a manufacturer of chemical products?—It has been for the last 18 years.

Now approaching that specification in that spirit does it give you sufficient directions to remove iron from alum solutions?—I have followed the directions, and I have given the results.

Now in the body of the specification amongst those directions are you told anywhere to use the natural peroxide?—I did not find it so. I made the first experiment, but when I came to look into the specification I found nothing that I could see there to direct me to use the natural ore, except perhaps that we all commence the cycle of making Weldon mud with the natural ore, which I did myself from 1870 to 1874. I made an immense amount of chlorine by means of the natural ore, and I had to buy it and analyse it, and to treat it in the same way.

Then the use of natural ore, which is referred to in the specification, is the use where the natural ore is dissolved in by hydrochloric acid?—That is the operation first, where we begin with the ordinary native manganese.

Is it or is it not true that following the directions with reference to the native peroxide would lead you to treat it with hydrochloric acid, and convert it into Weldon mud?—Yes, in a mode similar to that followed in the case of Weldon mud.

In a mode similar to that followed in the making of Weldon mud you say?—Yes.

If you treated the native oxide in that way would that give you successful results?—It would. I believe so.

In your experiments did it?—I did not take any peroxide *in the* laboratory to perform the operation for a very good *reason.*

Of course; but assume the condition of the peroxide which you operated upon being analogous to the Weldon mud which had been prepared in the usual way?—I knew that I could not in the laboratory perform the operation of making Weldon mud in the same way, or as well, as in the works.

You could not blow air through, for instance?—I knew that laboratory experiments are not so good in the results in the first instance.

As a chemical manufactured in a practical way, on the principle in which you treated it you knew that the result would be the removal of iron in the way specified by the patentees?—I have no doubt about that.

Now, in the body of the specification there is no reference to the production of peroxide of manganese, either from manganic or permanganic acid or their salts?—No, I do not find anything about that in the main body of the specification.

But there is in the claim this statement, "We claim the use of manganese combined with oxygen as peroxide, whether produced from lower oxides by oxidisation, or from manganic acid or permanganic acid, or their salts by deoxidisation? Yes, I see those are the words.

In 1882 was it known that you could produce peroxide of manganese from the lower oxides by oxidisation?—It was.

And was it known that you could produce it from manganic acid or permanganic acid, which he properly termed the higher oxides?—They would.

Was it known in 1882 that you could produce peroxide of manganese from the higher oxides of deoxidisation?—Yes.

Now take those which are here mentioned—manganic and permanganic acid—was it known that you could produce a peroxide from manganic acid; but first of all I will ask this——

Mr. Moulton: Please let that question be answered.

Mr. Aston: No; I will lay a foundation for it. Was manganic acid known in the isolated form?—I do not know. I have not known it.

Or permanganic acid?—No; I have not seen it, though I know it could be produced.

Both acids?—Yes, by the addition of acids to their salts: but the manganic acid immediately on its being formed decomposes into a precipitate of peroxide of manganese and into the solution of permanganate. Supposing you made a clear solution of permanganate of soda and added acid, you would get a precipitate of peroxide of manganese and get a solution containing permanganic acid mixed with sulphuric acid.

Is it not the fact that there are many substances which chemists know to exist in combination which they have not yet been able to separate in an isolated form?—Yes, that is so.

That applies to many substances?—Well, yes, to a considerable number.

Under those circumstances is it usual to deal with the materials in their combined form, and obtain compounds from those materials?—Mixtures?

Yes, mixtures—that is common?—Yes, it is common, and you very frequently find, when trying to isolate it, the pure material decomposes, and it cannot be isolated.

Now, if the question were set to you as a problem in 1882 to produce peroxide of manganese from the higher forms of manganic acid or permanganic acid, should you have known how to do it?—Yes.

Suppose that you had done it, Dr. Hewitt, and obtained peroxide of manganese therefrom, have you any doubt in your own mind what would be the effect of that peroxide of manganese in accomplishing the object named in the patent?—Well, I always have a doubt until I have tried it.

That is a very good answer; but have you any reason why peroxide in that form could not bring down the iron?—I know of no reason.

I do not know that I need go into Kynaston's specification. Have you that specification before you?—I have.

You have not told us, Dr. Hewitt, and I should have asked you before, have you had great practical experience?—Yes.

I believe you are the managing director of the great works of Brunner, Mond, and Co.?—Yes, I have been so for three years now.

And in those works you would have great practical experience?—On this subject I have none, except what I have obtained in the laboratory of Brunner, Mond, and Co., because we do not deal with manganese products now, but during the fifteen years before that, in which I was a partner in the firm of Richard Bealey and Co., at Manchester, for nine years of that time I made Weldon mud, and during the rest of that time I used native peroxide in making chlorine.

Now, with regard to Kynaston's specification, suppose you read that in the same spirit that you told my Lord you read the specification of Spence, would it tell you how to capture iron and remove it from solutions of sulphate of alumina?—Oh, yes: I think it does.

What would be the agent which would be employed there?—Hydrated peroxide of manganese, making manganite of hydrogen, as I see it is called; and it is also called in the provisional specification hydrated peroxide of manganese, but on the third line of the specification it is stated to be "peroxide of manganese" simply. The third line of the provisional specification says, "suffer decomposition by the addition of peroxide of manganese."

Cross-examined by Mr. Moulton.

Now, Dr. Hewitt, just let me ask you, before I go into the general question, a word or two about your experiments. Let me take the third one, going backwards. That was a solution of sulphate of manganese and bleaching powder was it not?—No, not bleaching powder.

You said hypochlorite?—Yes, of soda.

I beg your pardon, I had got it down wrong. That is the ordinary way of making manganite of soda, is it not?—It is the ordinary way of getting peroxide of manganese.

But, for a moment, is not that the regular way of getting manganite of soda?—I do not believe that it is. I do not know of anything called manganite of soda. I know manganate of soda.

Manganite I am talking about, or sodiac manganite, if you like that better?—There is a compound, or some people have a theory that there is a compound, $Mn\ O_2$ combined with soda.

At all events the peroxide would be hydrated, would it not, or else in combination with soda?—It would be hydrated.

Therefore, on the question as to whether or not the hydrated alone will work I may put that experiment alone on one side?—The hydrated itself would work.

But that would not tell us that the anhydrous would work?—It would not. I did not put it forward as telling.

A similar remark, of course, would apply to your first experiment, I mean the experiment with the Weldon mud itself. That is hydrated, is it not, or else it is in combination with lime?—Weldon mud is a mixture, and I do not recognise it as being anything else but a mixture; and, my Lord, I wish to say with respect to that, that the mixture in my own works varied from time to time, and, therefore, I have the greatest reason for saying it is not a definite chemical compound which has the same composition day after day, but has a different one.

Kindly answer my question, please. What I was asking you about was whether the peroxide there was—I gave you two alternatives—was it there hydrated, or else in combination with lime?—It is either hydrated, or in mixture, or in combination. I will put it in that way.

Are you prepared to say that there is no anhydrous in it?—I am prepared to say that there is no anhydrous in it.

That saves my troubling you further. Now, I want to go to your second experiment. In that case, you started with Weldon mud, did you not?—I started with Weldon mud washed and treated with hypochlorite.

You started with Weldon mud?—I did, treated in a certain way.

You started with Weldon mud, treated in a certain way, then?—Yes.

Well, that is only a difference of language between yourself and me. Now, you have told us that the peroxide in that mud which you started with in that sense is hydrated?—It is, part of it, at all events.

At all events, there is no anhydrous you have told us?—I have.

Now, if it was a question as to whether or not anhydrous peroxide would work, I put it to you that it was a bad experiment to start with something which certainly was hydrated?—But I did not make that experiment with the object of telling whether anhydrous was or was not present.

I beg your pardon. I thought that was the conclusion you came to?—It was when I came to my final experiment, in which I heated it. That was an experiment in which I tried as hard as I could to make artificially anhydrous peroxide of manganese.

I thought that was the experiment which I was upon; is it not?

Mr. Justice Kekewich: No.

Mr. Moulton: Then the witness and myself are at cross purposes. I am talking of one experiment and he is talking of another.

Mr. Justice Kekewich: Mr. Moulton, in order to make it quite clear, ask him to repeat what his second experiment was. It will only take a minute.

The Witness: I will go through them again in the ordinary way. First, with the mineral; second, with the mud treated with oxidisation; third, treated with nitric acid; fourth, treated in a bath up to 350 degrees.

Mr. Moulton: Then I will take those in order too. As to the mineral it substantially did not work, and you attributed that to the presence of iron?—It took out 27 per cent of the oxide of iron.

You say it took out 27 per cent?—Yes.

Now I will just ask with regard to that, did you test the mineral at all for the presence of the lower oxides?—Yes, I did. I satisfied myself that that had no lower oxides in it.

Of manganese?—Yes.

How did you satisfy yourself it had not?—Did you examine the minerals for the presence of the lower oxides of manganese?—No.

Then I may leave the mineral experiments out of the question. Then No. 2, I understand, was the one described in the specification where you started with Weldon mud and took the six parts?—Yes.

Then I may leave that on one side. The third one was where you started with Weldon mud and washed it with diluted acid?—Yes, nitric acid.

In order to take out the lime?—Yes.

The same as Dr. Hurter described?—Yes, I heard Dr. Hurter.

There is no doubt that that left the peroxide in a hydrated state?—It did.

Now in the fourth experiment you heated the peroxide to 300 or 350 deg.?—It was between 300 and 350 Centigrade.

And that last one was the sulphate?—Yes.

Now, I have dealt with all, excepting this one, where you have heated it?—Yes.

With regard to that, what I say is this: Just assume for a moment that the question is whether it must be hydrated or in combination with a base, or whether anhydrous will do. Just assume for a moment that that is the question between us. I put it to you that it is a bad type of experiment to start with, if you have to begin with hydrated peroxide. Do not you agree with me that, for a crucial experiment, one in which you start with it in the objectionable shape of the hydrated, is not a good one. As a chemist, is not that so?—I consider it quite sufficient.

You consider it sufficient, but it is a bad type of experiment, is it not?—I only know one way of making the peroxide of manganese anhydrous artificially. I think Dr. Hurter mentioned it yesterday—that is from the nitrate of manganese.

How do you do that?—You have to heat the nitrate down to dryness, then you have to drive the temperature to a very high point, in order to drive off all the nitrous fumes, and then you have, as described by Gorgeu who made the experiment, an extremely crystalline, hard compact, and heavy manganese oxide which he compared to the mineral polyanite.

That, I may take it, is the recognised way of getting really anhydrous, is it not?—I should not think so, when Gorgeu described it as crystalline hard and compact; in fact he distinctly says that the degree of hardness is greater—he compares it with braunite and polyanite, and, as I know, those minerals are extremely hard.

I am going by steps; is not that the recognised way of making pure anhydrous peroxide?—That is a recognised way.

And not only *a* recognised way——?—I am not at all prepared to say, as you want me to say, that it is *the* recognised way.

I took those words from you, for you told his Lordship that you only knew of one way, did you not?—To make it in the way you had spoken of to me previously.

You yourself put that upon me as the only way you knew?—I did not mean to do so.

At all events it is a recognised way? -Yes, I am conversant with the fact that it has been done in that way, and I am also conversant with the whole of the attending circumstances.

I will take that—we both agree that that is a recognised way. At any rate, there is some common ground to meet upon. You say that this gives it in a very dry and hard form. Have you ever actually made it yourself?—No, I have told his Lordship that I proceeded upon this specification, I do not consider that that comes within it.

I am only asking you this?—I did not make that experiment.

That powder or that crystalline solid might be triturated and reduced to a very fine powder, might it not—do you know anything against that?—I know that however you triturate the hard powders, it is difficult to bring them to the very finest state.

But you are not prepared to say that you could not make that into as fine a powder as you liked?—No, I think there are means known. I make a distinction, and can give reasons if you wish it; there is always a distinction to be made between oxides that are prepared at a high temperature, such as you must use in the case of making this Gorgeu's oxide of manganese, and oxides prepared——

Is there one word from beginning to end of the specification about the necessity of reducing to a fine powder or anything of the kind?—Not at all—there is not.

Then let us put that on one side. You agree with Dr. Hurter, I have no doubt, in this, that if true anhydrous peroxide of manganese is prepared, its chemical properties will not depend upon how it is prepared, but it will always work alike. You heard Dr. Hurter say that, did not you? Always work alike?

It will always work alike if it is pure peroxide of manganese. I am assuming that it is in the same physical condition?—Y[illegible] the moment you begin to assume I will follow y[illegible] gree with you that if you assume all the co[illegible] e same and the substances to be the same, [illegible] the same.

Th[illegible] ut that?—Not the least.

M[illegible] thought that was common

[illegible] what I thought, but your

[illegible] a reason for getting that

Mr. Justice Kekewich: It is there very clearly now, at anyrate.

Mr. Moulton: Now supposing that on being tried this peroxide when reduced to powder will not work—will not throw down iron; are you prepared to tell his Lordship that any pure anhydrous peroxide will do it?—Any pure, prepared in a different way.

Yes, but pure?—That is 100 per cent $Mn\ O_2$.

Yes.—100 per cent $Mn\ O_2$ is extremely difficult to get hold of; even Gorgeu did not do that.

You are not answering my question.—Yes, because you pin me down to a substance which is identical. $Mn\ O_2$ is incorrectly applied to anything but a 100 per cent $Mn\ O_2$.

I will respect your desire for accuracy, which I do not say is otherwise than laudable. I will take this peroxide prepared in this way: substances other than peroxide present there will be present in exceedingly small quantities, will they not?—If peroxide is composed of 63·6 per cent of Mn and 36·4 of oxygen exactly, there will be no other impurity.

That is not the slightest attempt at answering my question. I ask you whether, if you prepare peroxide of manganese in the way we are speaking of, the impurities would not be present in exceedingly small quantities?—In what way are you speaking of it?

Do you not know?—I do not know what you refer to, because you referred to several questions before. Do you mean Gorgeu's peroxide?

I am speaking about the formation of it for nitrate of manganese?—If you make it from the nitrate of manganese it is of extreme purity.

Supposing this to be powdered, if you like, and reduced to a fine powder, and supposing it is put into an alumina solution with iron in it, and it does not throw the iron down, are you prepared to tell his Lordship that any anhydrous peroxide will do it—supposing that experiment fails and does not take down the iron?—Judging from my own experience, I say that some anhydrous will.

I mean supposing that that fails to do it, I ask you as a chemist whether the fair conclusion is not that anhydrous peroxide will not, by itself, work?—I do not consider that that is altogether a fair conclusion, and I will give you the reason.

Give it me.—I have tried the experiment of taking native carbonate of magnesia, which is in an extremely hard and crystalline form and very pure, and I have tried to act upon chloride of calcium with that, brought down to an extremely fine powder, and I have found that the action is very slight, whereas precipitated carbonate of magnesia acts upon the chloride of calcium rapidly. That is the reason, I say, that polyanite or this pure peroxide that you speak of does not act, because of its physical condition.

Then I have it from you, at all events, that polyanite and this exceedingly pure peroxide does not act?—I have not tried the experiment.

But you have just told his Lordship that that is the reason——?—I said if it did not act. I told his Lordship that I never tried the experiment.

But you have heard, have you not, that it does not act?—I have not even heard it.

Not even that polyanite does not act?—No.

Can you explain to his Lordship how it was that that was in your mind as the reason why polyanite and this extremely pure peroxide did not act?—Because of the literature on the subject. I have read sufficiently about peroxide of manganese to know what that particular peroxide of manganese is that you refer to.

Do you say that the literature says that it will not act?—No, but I say that the literature says it is extremely crystalline, hard and compact.

You mean to say that when you said that that was the reason why polyanite and this exceedingly pure peroxide did not act, you had never heard or read that it would not act?—I have not heard or read that it would or would not act, one way or the other.

You have not?—I have not.

You say you are not prepared to say that this heating the nitrate is the only known way of producing the anhydrous? Can you give me another recognised way of producing it?—I have given you the only way I know of of making the hydrated peroxide give off its water.

And you cannot either point to an experiment or to literature which says that that will absolutely drive off the water. You heard Dr. Hurter say that he was not prepared to say that that would drive off the whole of the water?—I heard all he said, but I cannot recollect that particular statement.

Now, with regard to this temperature that we have been speaking of. At that temperature you would drive off some of the oxide, would you not?—Yes.

Therefore you would have in the result lower oxides present?—Yes.

I will just take what you call the lower oxides. Can you give me their chemical composition?—Mn O, Mn O_2, Mn_2 O_3, Mn_3 O_4, Mn O_3.

Mn O_3 would not be a lower oxide?—You asked me to give the oxides. I have given you from the lowest to the highest. There is no lower than Mn O that I know of.

Have you ever tried whether these intermediate oxides, Mn_2 O_3 and Mn_3 O_4 will send down iron?—I have not isolated those and tried them.

You have spoken of the ordinary ore of manganese—peroxide?—The ordinary ore is not peroxide.

Peroxide is a very well known ore, is it not?—It is found in crystals sometimes, such as pyrolusite and braunite, but the pure Mn O_2 is a very rare thing.

Do you say, or do you not say, that ordinary black oxide of manganese is chiefly Mn O_2? What do you mean by ordinary?—I mean it is very fine. It is a mixture varying from Mn O_2. It varies in every case, and must be determined by analysis.

What are the other principal substances to it?—Iron, alumina, silica very often, and water.

There are many specimens which are practically free from iron, are there not?—I do not think there are; there are very few. I believe that they vary from a half per cent to 52 per cent of oxide of iron.

How much iron was brought down in the case in which you used Weldon mud? You used 100 parts of dry cake and 6 of dry oxide, and then you brought down the iron, you said?—Which experiment do you refer to?

The first one, where you used 6 per cent, and found it sufficient?—Do you mean my first experiment with artificial?

With Weldon mud?—It took it down before it was washed in nitric acid almost entirely—it left a trace.

Can you tell me how much?—I can tell you that it was somewhere between 2 and 3 per cent of the original iron that I had in the solution. I began in a solution containing ·04 per cent of iron, and I left in the solution, to the best of my recollection, about 3 per cent of the original ·04 per cent.

You told us that you used [illegible] per cent of the dry peroxide?—I used the proportions [illegible]entioned in the specification, which are 6 parts of dry o[illegible]de to 100 parts of dry cake.

When you had heated [illegible]at up to, I think you said——?—300 or 350 degrees.

When you heated [illegible] after treating it with nitric acid, you tried that also o[illegible]lumina cake?—I did.

Can you tell me [illegible] proportion you put in then?—Yes.

What was the [illegible] It took 10 parts there to remove that iron—there was [illegible] a trace of iron there.

Does not th[illegible] show the presence of lower oxides of manganese?—[illegible] in that case. [illegible]ave already said that I got lower oxides

Now just [illegible] sum up your experiments. You found that you [illegible]fy an aluminous solution from iron by the use of [illegible]d peroxide, or by the use of a substance consistin[illegible]ur opinion, partly of anhydrous, but certainly ha[illegible]sent the lower oxides. Is not that so?—I can say that it would have been very easy for me—though I did not do it—to have peroxydised that again.

I will come to that directly, but now only want to sum up your experiments. You prove that iron can be taken down by the use of hydrated peroxide, or by the use of a substance consisting partly, as you think, of anhydrous, but having present in it the lower oxide?—Yes, but it was a very slight quantity.

I think your experiments do not refer to any case in which there was not present either the hydrated peroxide or these lower oxides?—The result of the final experiment contained certainly a small quantity of the original stock.

Now, I pass away from your experiments. By-the-bye, just look at Kynaston's specification. You see that, on page 4, he refers to "manganite of hydrogen" (which is "the hydrate or the peroxide of manganese") or other manganite that is effectual," and he says that, in his opinion, those are the only ones that are effectual. Is not that so? That is line 12?—The words are there in lines 11 and 12.

Now will you kindly look at Weldon's patent of 1869? (a copy was handed to the witness.) Look at page 5. This is the great Weldon mud patent, is it not?—It is one of them. It is not the first.

But it is the one which shows the Weldon mud plant, is it not?—Yes, that shows the sketch of the apparatus in a rough way.

You are perfectly familiar with this patent, are you not?—Well, I am not.

But you have worked under it, have you not?—Yes, I have worked it. I have told you so.

Now, let us see what Mr. Weldon says. He says: "I believe that my recent observations and researches respecting the peroxidation of hydrated Mn O in the wet way, and the influence thereupon of the presence of lime have fully established the following conclusion among others: Firstly, that Mn O_2 can be formed in the wet way by direct combination between Mn O and the atmospheric oxygen only in presence of some base with which the Mn O_2 can combine as it forms." That refers to the lime, does it not?—It refers to the lime.

"Only in presence of some base with which the Mn O_2 can combine as it forms." That is in lines 15, 16, and 17?—I disagree with that. It is one of Mr. Weldon's theoretical arguments put in this passage which has nothing whatever to do with the final fact. This is a very nice chemical.

Kindly answer my question?—I will.

Mr. Chadwyck Healey: Let him explain.

Mr. Justice Kekewich: I think you must get this out in re-examination, Mr. Healey.

Mr. Moulton: I simply ask this: That passage that I have put to you refers to the lime, does it not? I ask you what the author is referring to. I am not really trying to commit you to anything?—You referred to "only in presence," and you used the word "only" in an emphatic way, and I had to look to the context to see what it was before I answered.

I am asking you to help us to understand the meaning of the author—I am not asking you whether you agree with him in the least. That refers to the lime, does it not?—The word "base" refers to the lime and other things—it is not altogether to the lime—it refers to the lime and the protoxide of manganese.

Let me understand what that last is; it may save me some trouble. You mean that the author thinks it can combine with the lime so as to make manganite of calcium?—What I meant was that the author referred to it by the word "base" I knew Mr. Weldon——

Do not suspect me so much, Dr. Hewitt. You say that when he uses these words, Mr. Weldon is thinking——?—He is thinking of what he termed base.

And the things that he termed base were the lime of the protoxide of manganese?—Yes, and any little magnesia that might be present.

We will leave out the little magnesia for the moment. He was then referring to compounds, which, whether they existed or not, he thought existed, namely, $Mn\,O_2$ and $Ca\,O$, which would be a compound of calcium, would it not?—He refers to what is known as base in Weldon mud.

Now I am going to take you to the one you suggested to me—the combination of the peroxide with protoxide, that would be $Mn_2\,O_3$ or $Mn_3\,O_4$?—Or both combinations. Theoretically, you may complete them into $Mn\,O\,Mn\,O_2$; that would come to $Mn_3\,O_4$, or you may regard them as different substances from $Mn_3\,O_4$.

And Mr. Weldon, and those who took his views, spoke of all these as manganites of manganese, did they not?—Yes, they did.

I put it to you that that has never been disproved, and the name has been used by certain writers, and is understood?—As knowledge has increased about the Weldon process, the theory of the way in which it acts has had to be removed. Mr. Weldon himself modified his views before his death, because the quantity of base in Weldon mud ordinarily has varied.

I am not on the point of whether or not Mr. Weldon was correct. I am only on the point of the meaning of certain words. Mr. Weldon and those who followed him used the term manganites of manganese for the lower oxides, did they not?

Mr. Justice Kekewich: You draw the explanation on yourself, Mr. Moulton, by saying, "Mr. Weldon and those who followed him." The witness will give you a straight answer, first as regards Mr. Weldon, and then, if you ask him as regards those who follow him, he will, probably, introduce the modifications which varied knowledge has rendered necessary.

Mr. Moulton: I am not at all surprised at the witness answering in this way. He does not quite see what I am asking. I am asking him simply the meaning of the term. Mr. Weldon used the phrase "Manganite of manganese," for the lower oxides, did he not?—Which do you mean by the lower oxides?

$Mn_2\,O_3$ and $Mn_3\,O_4$?—He did.

I ask you to look at Kynaston's specification (the same passage as before) where he says, "It is only manganite of hydrogen (the hydrate of the peroxide of manganese) or other manganite that is effectual." That other manganite would refer, would it not, to manganite of calcium and the manganite of manganese?—It might be so.

That is the lower oxides of manganese?—When you speak of lower I do not know what you mean. $Mn\,O$ is the lowest oxide, therefore there is nothing lower than that.

I stand corrected. When I say lower oxides, I mean excluding the protoxide. The intermediate oxides I will say?—My difficulty is always in distinguishing what I am going to give the answer to.

$Mn_2\,O_3$ and $Mn_3\,O_4$. It would refer to them, would it not?—Yes.

Now, just to sum up the questions I have been asking you, let me put this: Your experiments show the throwing down of iron, as you have told us, when either hydrated peroxide is present, or the intermediate oxides of manganese are present. Is not that so?—Each experiment, of course, in my view, shows a shade of difference between itself and the other. I think the final experiment shows that manganese treated by known methods for removing combined water—raising the temperature above 112° C.—that is a well-known method for removing combined water from merely mixed water. I think that experiment indicated to me that even in the anhydrous state, if finely powdered, it would remove iron.

You are perfectly fair to say that is a conclusion which you draw?—I speak to the fact that I did use it, and that I saw it. I do not speak to any theory about it.

But in all your experiments there was present either the hydrated oxides or some of these intermediate oxides?—The experiments that I have given to the court I have adopted the means that I thought best for making the anhydrous peroxide.

That is not treating me fairly, because you are not answering my question. I ask you if, in all the experiments you put before the court, there was present either the hydrated peroxide or these intermediate oxides, were there not?—Yes, you are right.

You have not tried any other method of producing anhydrous, excepting those you have told me?—I have told you all.

There is one question I had forgotten. You say you used this product of heating the hydrated peroxide, and you told his Lordship that there would be there present a certain proportion on a large proportion. I think you said anhydrous. Did you examine whether when water was added to that it became hydrated?—I did not.

Are you prepared to say it did not?—I am not prepared to say it did not. I do not know either way. It is a very difficult thing for anyone to term it.

I believe Weldon mud was not ordinarily sold in the market at this time, because it was produced at the works where it was used. Is not that so?—As a common article of commerce it is unusual to sell Weldon mud, but before 1882 I had several inquiries in the market for Weldon mud. Most people use their old Weldon mud.

Now, will you kindly look at the claim of Spence's patent. You have neither seen permanganic acid or manganic acid, have you?—I have not.

To the best of your belief, manganic acid as distinguished from its salts has never been seen by anybody?—That is quite true.

And permanganic the same way?—It has never been seen isolated from everything else.

May I just call attention to the words of the Claim: "On manganic acid or perganic acid or their salts." In 1882 if you had been told to make anything—I do not care which it is—peroxide of manganese or anything else from either manganic acid, or permanganic acids as distinguished from their salts you would not have known how to do it, would you?—As distinguished from their salts I should not have got them. I should have had to get the salts first. They are not articles of commerce.

They are not articles in the laboratory?—I can make in the laboratory the permanganic acid. The moment I try to decompose a manganate, what occurs is this—the acid takes away the base and the manganic acid splits up in the permanganese, which goes down, and permanganese acid remains in solution.

You could not produce anything from either manganic acid or permanganic acid in 1882?—Yes. I wished to show that you would have to first separate them for the salts in solution.

You heard Dr. Hurter's evidence with regard to these various processes being substantially all modes in which peroxide can be produced?—Yes.

And that at will they can be made to produce the hydrated or the anhydrous?—Yes. I say yes, qualified in the same way that I spoke before of the anhydrous.

Now take the specification. Do you agree with him in saying that there is no distinction drawn—that there is nothing to tell the public that you must not use the anhydrous, or that you must use the hydrated?—The general description in the body of the specification shows me distinctly that the hydrated is what Spence included.

What Spence used in the instance he gives?—Yes, in the instance he gives.

But is there anything in the specification, which you can point to, which says that you are to use the hydrated and not the anhydrous?—No, the claim is wide and includes both.

Spence, in his patent, says peroxide of manganese formed artificially in a mode similar to the production of Weldon mud. What do you understand by that phrase?—I understand similar to the way in which Weldon mud is made, but I am not a manufacturer—peroxide of manga-

ially in the same manner as the well-known way Weldon mud.

derstand "similar" to mean in the same Yes, in the same manner.

ly oxidised I understand you to say is the powder?—That is to remove the protoxide. I that.

e there are other ways of fully oxidising that here not?—You may use soda and then blow must always add a base to take away the acid anganese and precipitate the protoxide and then low air.

sking about "fully oxidised by means well There are plenty of ways of fully oxidising ud, are there not?—Yes.

lerstand you to say that that would apply to any completely oxidising the body? Do you see o point to any special means of oxidising, or say, reading it as a chemist, that that refers to of oxidising?—Will you just show me the line? line 18.

ice Kekewich: I think you must take this; there an one mode. I think it is a question of con- It is on the line, but still if Dr. Hewitt admits is more than one mode, or that there are several n it is for me to say whether it points to all the

ilton: It is over the line I am afraid.

ness: I especially said how I oxidised.

e not tried other methods?—I have not, but I are other methods.

Re-examined by Mr. Chadwyck Healey.

he early questions put to you in cross-examina- friend was with reference to the composition of ud. You said that it was a mixture, and you r as to say that its constitution varied from time Yes.

you intended to add something else, but my ped you. If you have anything else to add will to tell me now what it is?—I had to have it under my directions daily, and I found that any s would lead to a very different composition of n mud. I also found that what is called the very considerably while worked. Weldon mud with a base—I have got it myself as low as ·5, e base sometimes (very frequently) runs up to equivalent of base for every equivalent of sent. It was that I referred to when I said that of the process had had to be modified from the lown to the present time. As the base diminished Mr. Weldon's explanation of the manganites altered, that is, he had to suppose at first that a of manganese was formed; then he had to hen he got down to ·6 that such a manganite of was formed. I daresay if Mr. Weldon could e figures to-day he would alter his views still

from your last answer that you are also referring ification of Mr. Weldon obtained in 1869?—Yes. from that also—correct me if I am wrong—that ents or the statements, I do not care how you pen to reconsideration at the present time?—Mr. facts are undoubted, but his explanation of the re modification.

e asked by my friend whether you had examined l mineral which you used for the purpose of the les, and I understood you to say that you had

you suppose would have been the effect of the le had it been present with the mineral?—It into the alum solution. You cannot make a f bauxite absolutely in solution; therefore the take up a portion of the lower oxide, and that go into the solution.

That would not be a desirable thing?—No.

You do not say it would have any effect in throwing down any portion of the iron?—No.

It would simply go into the alum solution?—Yes, and would render it impure from manganese instead of from iron.

Would a manufacturer have had any difficulty in appreciating that the moment it arose?—Not the least.

You would not consider that, from a manufacturer's point of view, a defect?—It is a defect from a certain point, but it could be got over. Every imperfection in manufacturing is *quoad* that imperfection a disadvantage.

What I meant rather to ask you was this: would the manufacturer have difficulty or not in removing that defect?—He would not.

Mr. Justice Kekewich: He would remove that defect by means so well known that they would occur to him?—Yes.

Mr. Moulton: I should like to ask a question upon that.

Mr. Justice Kekewich: You can when Mr. Chadwyck Healey has finished.

Mr. Chadwyck Healey: Would it occur to you as a manufacturer to try any other oxide?—It occurred to me at once as a manufacturer to try an artificial oxide. I never thought as a manufacturer that the natural oxide would act as well as the artificial. I know very well that in the chlorine process the natural ore that I used for the first seven years of my experience was a great deal more considerably used than the artificial oxide of manganese which I made by Weldon's process.

You said that the anhydrous peroxide of manganese, prepared by what I will call the nitrate of manganese process, is a very hard crystalline body?—That is what I described it as.

My learned friend, Mr. Moulton, has said that much.

Mr. Moulton: No, I took it from what he said.

Mr. Chadwyck Healey: Then I will put it in this way. If it were so hard a crystalline body would you, as a manufacturer, select that out of the various peroxides which you know as the one to use in this case?—I would not, because I have already had experience of the difference in manufacturing oxide of manganese from hard manganese and soft manganese, and I know that it is much easier and takes less acid to dissolve the soft manganese than the hard.

You said there was nothing in the specification about the division of the material by breaking it up into a powder. It does not tell you that you are to use the substance in the form of a division?—He says that I am to use it in the form of mud—artificial mud, in a manner similar to that form—Weldon mud, which I read as being in the form of mud.

Supposing you had been told to use the particular anhydrous peroxide of manganese which I presume for the present is hard and crystalline, in what form in 1882 would you have used that oxide if you had been given it. I suppose it is in the form of cakes is it not?—As I understand it and read about it, it is a crystalline substance, I should have had to try if I had been asked to make the experiment, to triturate it so as to get it into the finest state of division possible, and then I should have to try the experiment as laid down in the specification.

That was common knowledge to manufacturers at that date?—Yes.

Would you recognise that particular peroxide if you saw it?—I should recognise it I think by the description.

Can you tell me whether this is it (*producing a bottle*)?—Looking at a substance is not sufficient to establish its identity.

Will you kindly turn to the claim of Messrs. Spence's specification. Questions have been put to you by my learned friend Mr. Moulton upon that. You are asked whether you could prepare peroxide of manganese from manganic acid or permanganic acid. In the first place, to get an anhydrous peroxide of manganese may I take it that you have to treat it in some way or other the hydrated

through the apparatus to ensure that only the rtions are extracted, otherwise the other heavy ons are sure to be deposited somewhere and be question of satisfactory carbonisation is much cate than appears at first sight, and, no doubt, he failures we hear of arise from the subject ated entirely from a mechanical instead of a point of view. The naphtha of the tar having acted by the air current, the residue will not, of so suitable for distillation as before treatment, ll the less volatile constituents will remain l, such as solvent naphtha, creosote, carbolic acid, acene. We have heard it affirmed that the tar, ment by Hawkins's process, is not depreciated preciable degree, but to those who argue thus, we here is neither sense nor reason in their argument, not entertained for one moment by anyone who ightest chemical knowledge whatever.

AMERICAN OLEOMARGARINE.

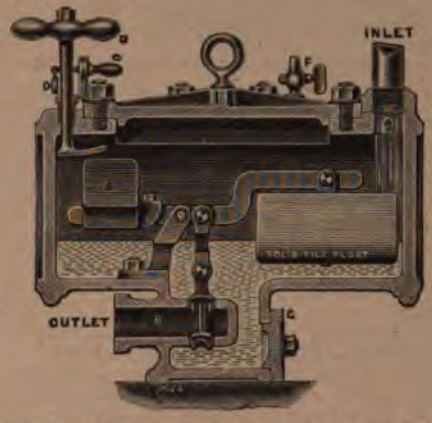
rking of the American Oleomargarine Act, which force on the 1st of November, 1886, is referred at length in the report of the Commissioner of Revenue for the fiscal year ended the 30th of 7, just received. During the eight months of the f the Act the sum of $723,948 had been received duty of two cents a pound and the licenses paid facturers and dealers; and, the Commissioner amount during the succeeding four months, g the first year of the operation of the Act, the total receipts to nearly a million dollars. ntity of oleomargarine on which duty was ng the eight months was nearly 22,000,000lbs. t of the charges and the restriction of the Act nagined from the fact that the number of firms in the oleomargarine trade was 7,302 prior to 1887, and fell to 1,584 during May and June. ly manufacturers and dealers did not find it to pay the duty and heavy licenses, the demand argarine having fallen off when it could no longer butter. At present the licenses are 600 dollars ufacturer, 480 dollars on a wholesale dealer, and on a retail dealer. The Commissioner recom- e reduction of the dealers' licenses to one-fourth esent amounts, to prevent the fraudulent sale of arine. Since the price of butter rose it appears f the imitative article has increased, and a great believed, is sold fraudulently as butter.

MACDOUGALL'S STEAM TRAP.

are, we presume, but few members of the chemical d industries who, at some time or another of their uring experience, have not encountered a steam ry useful is this appliance when it acts properly, it gets out of order and refuses to let away the d water, it is not only useless but positively s. We ourselves have had experience with the of steam traps to be met with in the market, and ned a very poor opinion of most of them; and we o come to discard all those which throttle the into the trap, by means of a valve or any other rrangement. A steam trap, to be a useful trap, present an enlargement of the steam pipe, form- ity, into which the condensed water should enter soon as it is formed. If this were the only it would not be a difficult one to solve; but as this water has to be let out periodically, mechanism ed for that purpose, and herein lies the weak point eam traps. Up to the time of seeing the trap rms the subject of this present notice, we had only ross one we should have cared to describe as satisfactory, and that emanated from the German firm of Klein Schanzlin and Becker, in Frankenthal; but now we are pleased to say that in our opinion Messrs. MacDougall's steam trap is even an improvement on this.

In dye houses, bleach works, paper mills, breweries, and above all, in all departments of manufacturing chemistry steam is used, either in coils or jackets for heating purposes, and it is important for the economical use of such steam that the coils or jackets should be water free. Most of the existing traps have proved so unsatisfactory in use that it is quite a common thing in visiting such factories to see the steam trap dispensed with altogether, its place being occupied by an ordinary steam valve so regulated that a slight passage for steam and water is always left open. It is unnecessary to dilate upon the wastefulness of such a system, but it has been brought about by the inefficiency of the existing apparatus, so that, no doubt, when the more perfect trap becomes known, economy of steam for heating purposes will be the result.

Messrs. MacDougall's steam trap is shown by the accompanying illustration:—



It consists of a cast-iron vessel of cylindrical form, constructed to withstand high pressure, the inlet being at A and the outlet at B. Within this cylinder is suspended a lever having at one end a solid tile float balanced by a heavy weight at E, which rises into the steam space of the trap. Near the fulcrum a short link connects the lever with the equilibrium valve, and as the tile float is raised by the entering water the valves are opened and the water discharged. The apparatus is so simple in its construction that our readers will be able to follow its action at a glance. A loose test lever D, passing through a stuffing box, is provided for the purpose of testing or blowing through the valves, as it is well known that grit, scale from the pipes, and other accumulations tend to make them leaky. In starting a range of steam pipes after a stoppage, or in the first instance, the air has to be got rid of, and for this purpose a small pet cock F is provided, but as we have always found automatic air valves act perfectly, when properly constructed, we should prefer them in this case.

When connected with coils or steam jackets, the trap must, of course, be connected at a lower level than that at which water is liable to accumulate, and when used in connection with steam mains, a dryer or separator should be interposed, the trap being connected with the dryer by means of the inlet pipe A. If free from fatty acids, the condensed water may be collected and used for boiler feeding, or for many purposes in chemical industry too numerous to mention. The trap is slightly higher in cost than some others, but when it is known that all the working parts, such as test-handle, gland, valve seati and connections are made of gun metal, this will not wondered at; but when it is seen that prime cost adds the efficiency of the apparatus, and saves time in rep-

the higher price will not be grudged. We find a 2" trap costs £9. 10s., while one of another pattern, costing only £6. 10s., which we have in our mind's eye, cost, to our own knowledge, over £5 during the first year in fitter's time trying to make it work satisfactorily; in fact, some steam traps are standing dishes for the fitter's shop, which this one does not appear to be.

Correspondence.

ANSWERS TO CORRESPONDENTS.

Our Correspondence has now increased so largely that we cannot continue to reply to all through the post.

B. H. C.—It is very unlikely that the foreign sugar bounties will be given up without a struggle.

H. R.—We believe the process can never compete with pyrites.

A. C. C.—You ought to be very careful respecting the Welsh gold boom. If you have been so unfortunate in other gold mining enterprises your experiences should be a lesson to you. Be wise in time.

X. Y. Z.—Hydrochloric acid would serve your purpose, not sulphuric; for several reasons.

A. Z.—Copper is getting to a dangerous level. We cannot advise you.

Gas.—Oil is cheaper than coal-gas, but would not be cheaper than water-gas.

Technical.—The inspectors have no power to stop a work, but must bring an action.

R. H. L.—You are quite correct, it has been a waste of public money.

L. A. F.—We shall have an article on pyridine in our new year's number.

To Subscribers.—The eight stones upon which our chromo almanack was placed were destroyed in our printers' fire, and all the work has had to be done again. It is now again in progress, but it is a question whether it will be ready in time for distribution with our new year's number.

*** *We do not hold ourselves responsible for the views expressed by our correspondents.*

MULTIPLE EVAPORATION.

To the Editor of the Chemical Trade Journal.

Sir,—In reply to your correspondent "A Paper Maker," Chapman's multiple evaporator is in use at Messrs. Potter and Co.'s mill, at Darwen. It proved very costly to erect, but it evaporates 22lb. of water per lb. of coal burnt under the boilers. In addition to this, about 10cwt. of coal is used for the furnaces for calcination. No doubt Messrs. Potter would give all information upon the subject if they were applied to in the usual manner.

About Störmer's multiple evaporator I have heard but little, but have been told that it requires about 12cwt. of coal per ton of ash recovered, and would like some information about it myself, if any of your readers can give it.—Yours, &c., Esparto.

THE INSTITUTE OF CHEMISTRY.

To the Editor of the Chemical Trade Journal.

Sir,—In reference to the letters which have appeared in your columns anent the Institute of Chemistry, permit me to enter a protest against the idea of the profession of chemistry being restricted to those who are members of a society that has, so far, shown itself incapable of comprehending the interests which it was formed to protect.

Besides myself, I know many whose chemical experience dates further back than the existence of the Institute, who seeing no practical outcome from its work during the first two years, during which admission without examination was possible, could not see their way to join it, and of course when examination was made essential the probability became much more remote, having neither time nor inclination to go through so much for so little.

I [illegible] ed the advertisements referred to by one of [illegible] lents, and have been considering whether [illegible] s worth having or not. Perhaps if the [illegible] something to induce confidence in a [illegible] to come, the society might be saved [illegible] myr guinea is ready, and I can answer for at least half-a-dozen more who are ready—nay, anxious—to send in their subscriptions as soon as they can see the prospect of advantage thereby.

The Institute has been too long a mere receiver of subscriptions, and it is high time that something should be done to save its "Fellows" from becoming ashamed of their titles.—Yours truly, J. K. H.

WATER-GAS.

To the Editor of the Chemical Trade Journal.

Sir,—Mr. A. Wilson, whose interesting letter I have read in your last week's issue, would be doing many of us a service if he would supply a few working details as to the cost of water-gas, as I infer from his letter that he has it working at his own house. I have read your very interesting articles on this subject in previous numbers, but if I may be allowed to say so, there is wanting in them the very information I am asking for. Myself and several of my friends have made up our minds to discontinue paying the exorbitant price for gas for use in our mills, so soon as we can see our way to something cheaper. We have examined all the recent introductions—paraffin gas and the like—but cannot make up our minds to change to any of those systems; but water-gas seems to be just the thing wanted, and if the statements made in your articles can be borne out in practice, there is no doubt there is room for a very large introduction of water-gas. I would wish it to be understood that I am not desirous of casting any doubt upon the statements contained in the articles on water-gas, but "an ounce of practice is worth a pound of theory" in such matters.—Hoping you will be able to insert this letter in your next issue of the *Chemical Trade Journal*, I am, yours, &c., Sigma.

WEST OF SCOTLAND CHEMICALS.

GLASGOW, Tuesday

The market offers little of fresh feature, unless the reported squeeze in paraffin oil (burning) be cited as something new. As high as 9d. per gallon is alleged to have been paid to serve an emergency, and although the strict accuracy of this may be doubted, the article is certainly very scarce, and holders realise 7d. with readiness. Works being now on full output, the stress must, of course, be but temporary in its nature, and in a few weeks exhausted stocks will begin to be replenished. The other paraffin varieties maintain late rise for the most part, but naphtha has been sold for rather less. Sulphate of ammonia is still strong, and last week's quotations are more than upheld. In the other chemicals there has been almost a complete absence of change or movement, partly owing to the special corner of the year, which induces a kind of chronic condition of holiday-making and cessation from work from now till well into the first week of the new year. Bleaching powder and soda crystals are, as at the time of last report, rather weak, but caustic soda has been slightly firmer in its quotations for forward delivery. Most of the pigments in use by the Scotch dyeing industry have advanced in price during the month, partly because of the present activity of these works in Glasgow neighbourhood, Vale of Leven and Dundee, and partly owing to an increasing faith in a revived general trade over the next year. Chief prices current are:—Soda crystals, 41s. 6d. net Tyne; alum, £5, less 2½% Glasgow; borax, English refined, £31, and boracic acid £46 net Glasgow; soda ash, 48/52°, 1d., less 5% Tyne; caustic soda, white, 76° £9, 70/72° £7. 2s. 6d., 60/62° £6. 2s. 6d., and cream, 60/62° £6, less 2½% Liverpool; bicarbonate of soda, 5 cwt. casks, £5. 15s., and 1 cwt. casks, £6 net Tyne; refined alkali, 48/52°, 1½d., less 2½% Tyne; saltcake, 21s. 6d., less 2½% f.o.r. Glasgow; bleaching powder, £7. 17s. 6d., less 5% f.o.r. Glasgow; bichromate of potash 4½d., and of soda 3½d., less 5% and 6% to Scotch and English respectively; nitrate of soda, 9s. to 9s. 3d.; chlorate of potash 6½d., less 5% any port;

sulphate of ammonia, £12 to £12. 5s. f.o.b. Leith; paraffin scale, hard 2½d., soft, 2d.; paraffin wax, 120° semi-refined, 3d., and remelted, 2¼d.; paraffin spirit, 7d.; burning oil (mineral), 5¼d. to 7d.; lubricating oil (mineral) £5. 15s. to £7. 10s.; sulphate of copper, variable at about £22. Greenock last week landed 73,717 bags, and 5,927 baskets of sugar, and other Clyde imports included 1,224 barrels rosin, and 8,265 tons iron ore.

THE ALKALI TRADE.

The market is now somewhat firmer in tone, the Liverpool price for soda-ash, f.o.b., being ⅝d. Caustic soda, 60% white, £6. 5s.; cream, £6. 3s. 9d.; while 70% is value for £7. 5s. Soda crystals, £2. 15s. Silicate of soda, brown lump, £6. 15s.; 100° Tw. solution, £4. 17s. 6d. Bleaching powder, £7. 10s. for soft wood. Hyposulphite of soda, dry and white, £5. 15s. The holidays interfere considerably with business, but there are signs of improvement for the new year.

THE MISCELLANEOUS CHEMICAL MARKET.

There is little change to report in values for the past week. Prices are steadily maintained over a wide range of varied products, and there is an absence of any undue excitement, which may be considered a satisfactory feature, inasmuch as it is favourable to legitimate business. Copper is, however, maintained at its speculative value, and sulphate of copper is firmly held for advanced prices. Spelter continues to advance, and zinc salts are firmer. Oxides of zinc are dearer, but chlorides and sulphates are without change. Lead is higher in price, and lead salts are firmer in consequence. Acetates of lime and soda are quiet, but prices are firmly maintained. Acetic acid, of all qualities, is still selling at low prices. Aniline oil and salt are at 9¼d. and 8¼d. respectively, with firmer tendency owing to advance in benzol. Alum and sulphate of alumina meet with moderate demand. Bleaching powder sells freely at £7. 7s. 6d. to £7. 10s., rails, Lancashire. Soda-ash and caustic-soda are moving off slowly at last week's prices. Potash, carbonate and caustic, is without change, and a fair amount of business doing.

THE TAR PRODUCTS MARKET.

Benzol is reported firmer, and 3s. 3d. and 2s. 9d. is being asked for 90's and 50/90's respectively. We wish we were able to report this being a healthy rise, but the indications are that the purchases are all in one direction, which is already full to overflowing. The position is a very ticklish one, and grows more serious day by day, as the present prices taken by themselves do not in the least dispel the dark cloud that hangs behind. Solvent naphtha is very firm at old prices, and creosote is in good demand for the "Lucigen," "Luminator," and other lights. Carbolic acid (crude) still keeps in good demand and firm in value, and several good contracts have been entered into covering the whole of next year. Anthracene remains at its former price—1s. for B and 1s. 3d. for A quality. Grease oils are becoming a drug in several districts, and are being mixed off with creosote. Pitch remains in *statu quo*, and whether the new year will do anything for it is hard to say.

THE SULPHATE OF AMMONIA MARKET.

There are appearing very sure indications of a good market in the spring, and if makers will only be careful how they deal with their production, they need fear but little for the future. German buyers had been led to believe that they had only to hold off and sulphate would fall to their level, but to their chagrin this has not turned out to be the case, as other markets have been found for it, notably amongst the sugar growers in the West Indies, who are now using more than ever, to their manifest advantage; and now that the German buyers wish to come in, there is none for them. Stocks are very low indeed throughout the country, and makers are not anxious to sell forward. Why should they, when everything is telling in their favour? Hull sulphate is selling freely at £12. 5s. to £12. 7s. 6d., and is soon expected to reach £12. 10s. Beckton price was fixed at £12. 10s. some time ago, when it was seen how matters were tending, and both Liverpool and Leith are firm at £12. 5s. to £12. 7s. 6d.

THE PATENT LIST.

The following list has been compiled expressly for The Chemical Trade Journal, *by* G. F. Redfern & Co., *Patent Agents, 4, South Street, Finsbury, London, and at Paris and Brussels.*

APPLICATIONS FOR LETTERS PATENT.

17347. E. Meyer. For improvements in or relating to the production of ammonia and oxalic acid, and alkaline salts, from the residue of molasses without carbonisation. Dec. 16.

17412. H. H. Lake. A communication from C. Netto, Germany. For improvements in the manufacture of sodium and potassium, and in apparatus therefor. Dec. 17.

17511. J. Y. Johnson. A communication from Farbenfabriken vorm, F. Bayer and Co., Germany. For improvements in the manufacture of induline dyes for printing on textile fabrics.

17522. M. Vogelsang. For an improved explosive substance, and in the combination of materials used for the same. Dec. 20.

17536. W. Atkinson and G. A. J. Schott. For improvements in apparatus used for holding, passing, or otherwise coming in contact with acids and other corrosive fluids. Dec. 21.

17551. J. Frost. For improvements in producing colouring matters, and in dyeing and printing textile fibres and fabrics. Dec. 21.

17558. W. H. Bennett. A communication from I. Lamy, Paris. For improvements in the mixture and treatment of materials for enriching coal-gas, and in removing or preventing stoppages in ascension pipes. Dec. 21.

17583. O. Imray. A communication from R. Nietzki, Switzerland. For improvements in the production of yellow and brown colouring matters or dye stuffs. Dec. 21.

17586. C. D. Abel. A communication from Messrs. R. Koepp and Co., Germany. For improvements in the use of chromium compounds in dyeing and printing. Dec. 21.

17612. F. L. Teed. For improvements in purification of sulphuric acid. Dec. 22.

Obituary.—Many former students of the Royal School of Mines will regret to hear of the death of Dr. T. S. Humpidge, Professor of Chemistry in the University College of Wales. Professor Humpidge was only 34 years of age.

Free Trade Blessings.—The muriatic acid "combination" has issued a circular to all other alkali manufacturers who have not been selling acid this year requesting them to promise not to sell any acid this next year at any price, their excess production (over their requirements for bleaching powder) to be run into the river to feed the fishes or to polish the copper and iron bottoms of the ships floating in the Mersey, but on no account must they offer it for sale, and thereby interfere with the exclusive dealing of those manufacturers who wish to make the acid trade their own. Verily they are sowing the wind to reap the whirlwind.

[illegible]

[illegible] Street, Manchester.

[illegible] *The prices in different* [illegible]

		£	s.	d.
[illegible]	per ton	10	0	0
[illegible]	,,	14	10	0
[illegible]	per oz.	0	2	6
[illegible]	per ton	2	7	6
[illegible]	per cwt.	1	17	6
[illegible]	,,	0	10	0
[illegible] Salts)	per ton	2	10	0
[illegible]	,,	18	10	0
[illegible]	per cwt.	2	5	0
[illegible]	per ton	2	10	0
[illegible]	per gallon	0	2	3
[illegible]	,,	0	4	0
[illegible]	,,	0	5	6
[illegible]	per cwt.	1	5	3
[illegible]	per ton	20	0	0
[illegible]	,,	20	0	0
[illegible]	,,	7	10	0
[illegible]	per gallon	0	0	5¾
[illegible]	,,	0	0	6¼
[illegible]	per oz.	0	3	8¼
[illegible]	,,	0	2	9
[illegible]	per cwt.	0	8	9
[illegible]	,,	0	11	0
[illegible]	per lb.	0	6	0
[illegible] Soda ash 48 %	per ton	4	12	6
[illegible] Caustic Soda ash) 48 %	,,	4	0	0
[illegible] Soda ash 48 %	,,	4	0	0
[illegible] Crystals	,,	2	8	9
[illegible] Carbonate)	,,	5	0	0
[illegible]	per lb.	0	0	7½
[illegible]	per cwt.	1	9	6
[illegible]	per lb.	0	0	3½
[illegible] Caustic Soda)	per ton	8	0	0
[illegible]	,,	7	0	0
[illegible] white)	,,	6	0	0
[illegible] cream)	,,	5	18	9
[illegible]	,,	5	17	6
[illegible]	,,	5	15	0
[illegible] ex ship Liverpool	per cwt.	0	9	3
[illegible]	per ton	5	10	0
[illegible] Tw.)	,,	4	7	6
[illegible] Salt-cake)	,,	1	1	0
[illegible] Glauber's Salts)	,,	1	17	6
[illegible]	,,	5	12	6
[illegible]	per oz.	0	3	10
[illegible]	per lb.	0	0	4½
[illegible]	per cwt.	0	17	6
[illegible]	per lb.	0	0	6½
[illegible] Caustic Potash)	per ton	21	15	0
[illegible]	per cwt.	1	2	0
[illegible] Yellow	per lb.	0	0	7½
[illegible]	per ton	9	15	0
[illegible]	,,	8	10	0
[illegible] Hydrate, 98 %	,,	7	0	0
Sugar Beet	per cwt.	0	16	3
[illegible] Cane	,,	1	0	0
Sulphocyanide of Barium	per lb.	0	0	5¾
[illegible] Ammonium	,,	0	0	8½
Sulphur (Flowers)	per ton	9	5	0
[illegible] Roll Brimstone)	,,	5	15	0
Superphosphate of Lime (28 %)	,,	2	5	0
Tallow	,,	25	10	0
Tin (metal)	,,	152	5	0
[illegible] Crystals	per lb.	0	0	9¾
Zinc (Spelter)	per ton	21	5	0
[illegible] Chloride (solution 96° Tw.)	,,	5	15	0

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J. Dunlop Mitchell & Co., 130 and 136, Ingram-street, Glasgow. Sample and Show Bottles.—*See Advt.*
Nuttall & Sons, St. Helens.

Glycerine—
Hazlehurst & Sons, Runcorn.—*See Advt.*

Gums and Starches—
Higgin, Lloyd & Co., Little Peter-st., Manchester.
Sutton & Staniar, Gravel Lane, Salford.

Hyposulphite of Soda—
J. G. & W. H. Richardson, Curlew Chemical Works, Jarrow-on-Tyne.

Indiarubber Chemicals—
Grimshaw Bros., Clayton, near Manchester.
Arnott & Button, Rainham, Essex.
Forster & Gregory, Streatham Common, London, S.W.

Indiarubber Manufacturers—
Charles Macintosh & Co., Cambridge-st., Manchester.
D. Mosely & Sons, Ardwick, Manchester.

Isinglass—
Gridley & Co., Bishopsgate Avenue, London, E.C.

Laboratory Apparatus—
J. J. Griffin & Sons, Covent Garden, London, W.C.
Mawson & Swan, Newcastle-on-Tyne.
Philip Harris & Co. Limited, Bull Ring, Birmingham.

Lime and Limestone—
T. Beswick & Sons, Buxton.
Buxton Lime Co. Limited, Buxton.
Great Rocks Lime & Stone Co., Peak Forest, near Buxton.
John Hollingworth, Ashwood Dale, Buxton.
Kneeshaw, Lupton & Co., Liverpool.
J. & M. Tymm, Marple, near Stockport.

Magnesium—
Magnesium Metal Co., Patricroft, near Manchester.

Manures—
Jekyll, Glasier & Co., Cornhill, Lincoln.
Lindsey & Kesteven Manure Co. Limited, Saxilby.
Morris & Co., Doncaster.
William Sharratt, Droylsden, near Manchester.
T. Vickers & Sons, Miles Platting, near Manchester.

Mercury Preparations—
May & Baker, Battersea, London.

Methylated Spirit—
T. Tabberner & Co., Rochdale-rd., Manchester.

Microscopes—
Powell & Lealand, Euston-rd., London.
Ross & Co., New Bond-st., London.

Nitric Acid—
Thos. Jackson, Clayton, near Manchester.

Oil Merchants and Brokers—
Bagnall & Bramwell, 4, St. Ann's Square, Manchester.—*See Advt.*
J. Smith & Co., Port-st., Manchester.

Oil, Tallow, and Grease Refiners—
Colledge, Roy & Co., Red Bank, Manchester.
David Shaw & Co., Clayton, near Manchester.
Smith & Forrest, Holt Town, near Manchester.

Oxalic Acid—
J. D. Peitchard, Crymlyn Burrows, near Swansea.

Oxygen—
Brin's Oxygen Co. Limited, Victoria-st., London, S.W.—*See Advt.*

Paints and Varnishes—
J. B. Freeman & Co., Battersea, London.

Paraffin Products—
Broxburn Oil Co. Limited, 28, Royal Exchange, Glasgow.
The Stanrigg Oil Co., Airdrie, N.B.

Phosphate (precipitated)—
Marple Chemical Co., Marple, near Stockport.

Phosphorus—
Albright & Wilson, Oldbury, near Birmingham.

Potassium—
Magnesium Metal Co., Patricroft, near Manchester.

Red Lead and White Lead—
T. Adkins, Smethwick, near Birmingham.

Refrigerating Apparatus—
Linde's British Refrigeration Co., 32, Walbrook, London.

Roofing Felt—
Croggon & Son, Victoria Bridge, Manchester.

Sal-ammoniac—
J. B. Aitken, Widnes.

Salt Manufacturers and Merchants—
Cheshire Amalgamated Salt Co. Limited, Winsford.
John Corbett, Stoke-Prior, near Bromsgrove.
William Hayes & Son, Runcorn.
Massey & Bibbey, Odd Rode, near Stoke-on-Trent.
Simpson, Davies & Sons, Runcorn.
Jos. Verdin & Sons, Winsford.

Size and Sizing—
E. Butterworth & Co., Gt. Ancoats-st., Manchester.
East Lancashire Chemical Co., Fairfield, near Manchester.
Marple Chemical Co., Marple, near Stockport.—Prepared Ho[illegible]
Waring & Co. Limited, Warrington. [Pit[illegible]

Sizers' Chemicals—
Grimshaw Bros., Clayton, near Manchester.—*See Advt.*
J. & J. Rooke & Co., Red Bank, Manchester.

Spelter—
E. W. T. Jones & Co., Monmore Green, Wolverhampton.

Steam Jet Apparatus—
Jas. Meldrum, 24, Cathedral Yard, Manchester.—*See Advt.*

Stone Breakers—
W. H. Baxter & Co., 88, Chapeltown Road Leeds.

Sulphate of Ammonia Manufacturers—
Dyson, Sons & Brotherton, Wakefield.
Pease & Partners Limited, Darlington.

Sulphate of Ammonia Plant—
George E. Davis, 301, Great Clowes-st., Manchester.—*See Advt.*
R. & J. Dempster, Newton Heath, Manchester.—*See Advt.*

Sulphuric Acid—
John Nicholson & Sons, Hunslet, near Leeds.
Tennants & Co., Clayton, near Manchester.

Tar Distillers—
Forbes, Abbott & Lennard, East Greenwich, London.
Hardman & Co., Miles Platting, Manchester.
J. C. Major, Wolverhampton.
J. Miller & Co., Sandilands, Aberdeen.
Thos. Ness, Black Banks Chemical Works, near Darlington.
J. Ross & Co., Falkirk, N.B.

Umber—
W. J. Furnival, Hanley, Staffordshire.

Vanadium—
Magnesium Metal Co., Patricroft, near Manchester.

LONDON, 1862.

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